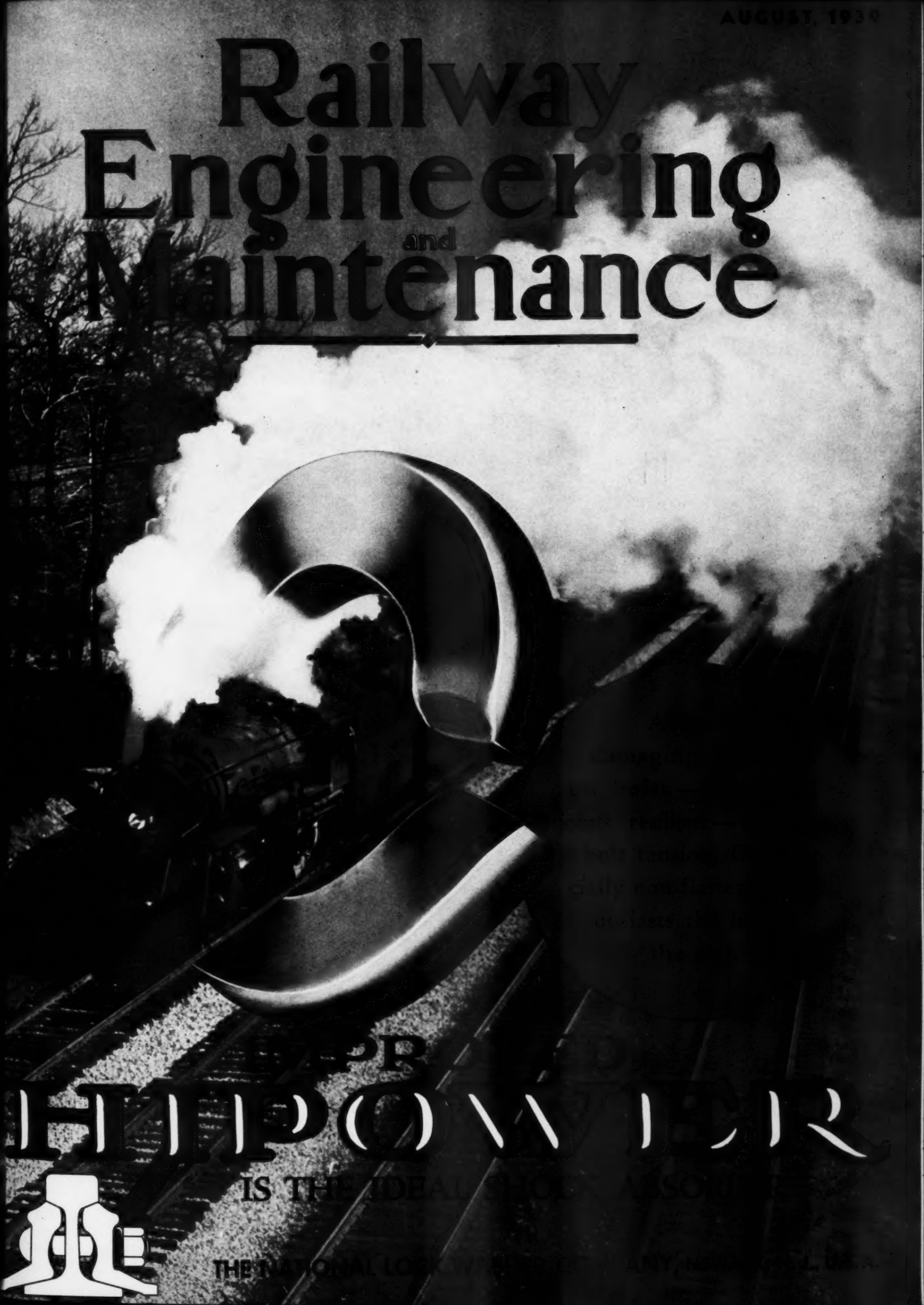
AUGUST, 1939

Railway Engineering and Maintenance



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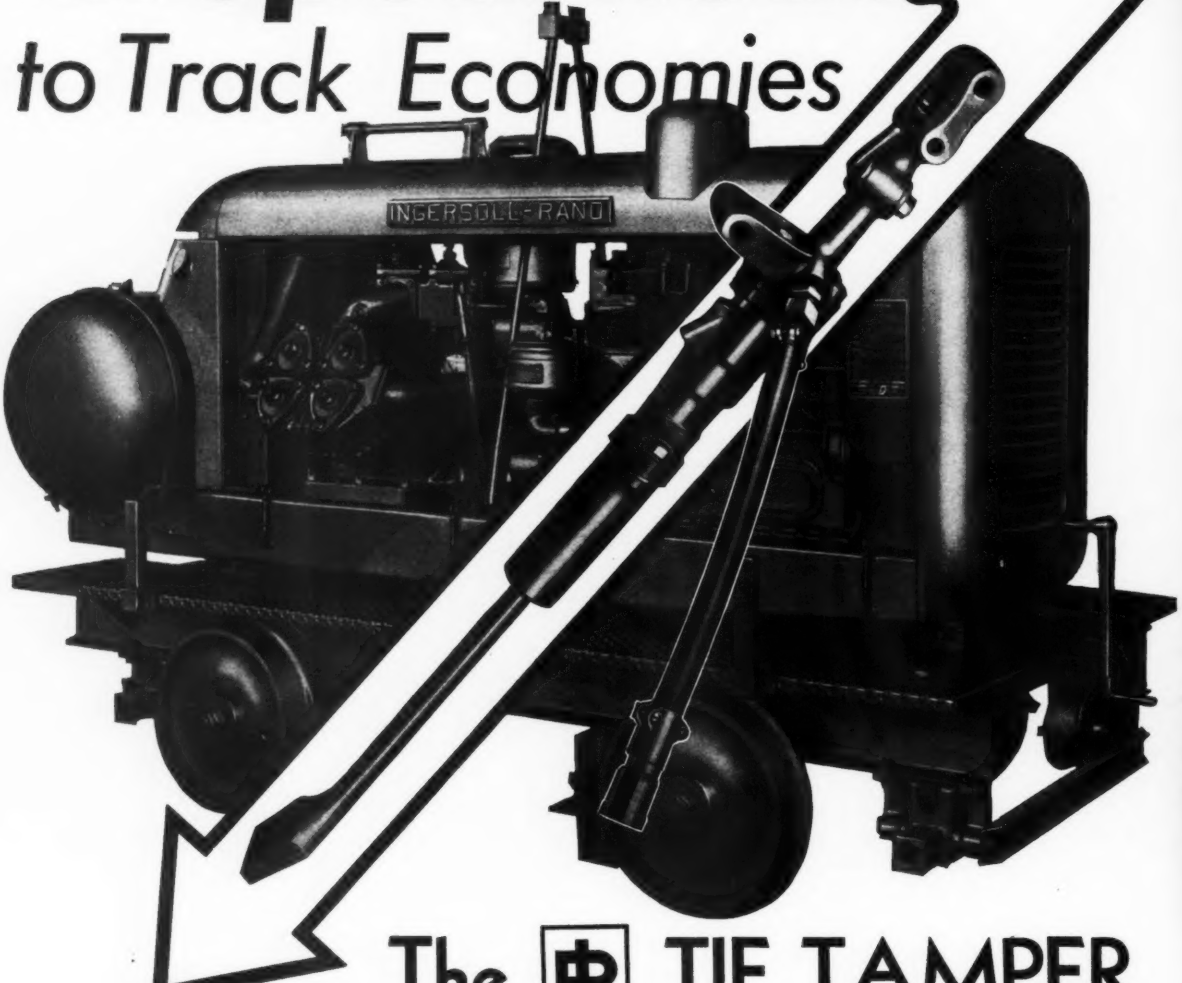

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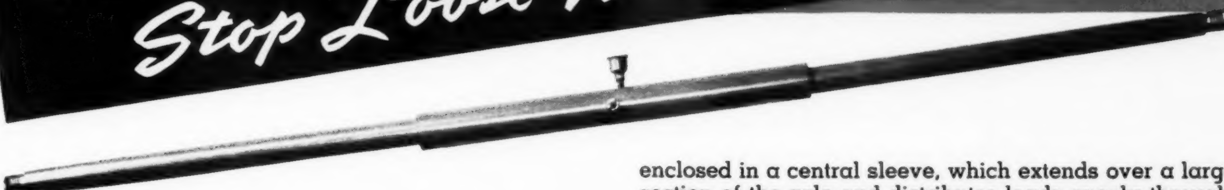

Free turning wheels on each "loose wheel" axle are essential to safety. With ordinary loose wheel bushings, however, difficulties frequently arise which eliminate this safety feature and increase operating costs unnecessarily. A loose wheel not oiled or in poor condition may stick and hinder removal of the car from the track. With ordinary loose wheel assemblies there is also the danger of wearing the unit to a loose wobbly fit which is unsafe.

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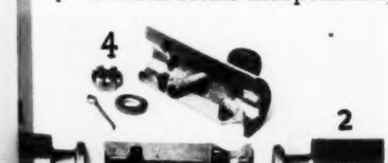

The Fairmont Differential Axle consists of only 5 parts aside from the bolt and grease cup. They are the two halves of the axle, the two halves of the central bronze bushing, and the central axle sleeve which encloses the assembled unit.

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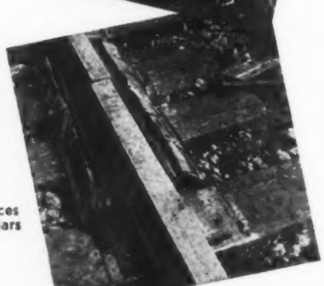
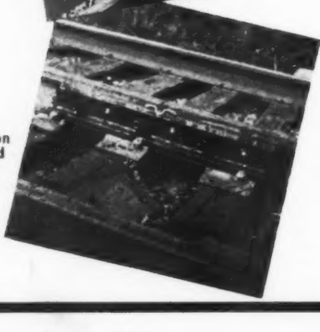


Laid on Inner Faces of Joint Bars

Bars Placed Against Rail

Bolts Inserted in Conventional Manner



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Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

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CHICAGO, ILL.

Subject: Significant Figures

August 1, 1939

Dear Reader:

To those of you who are inclined to study trends, the following figures will be of interest:

In the first 28 weeks of this year, ending July 15, revenue car-loadings totalled 16,576,043, an increase of 8.1 per cent over 1938. In the last week of this period the increase was 11.8 per cent. The thirteen shippers regional advisory boards estimate that the loadings in the third quarter of this year will increase 9.9 per cent.

For the first five months of 1939, railway operating revenues were $128,523,453, or 9.5 per cent, larger than last year. Preliminary figures indicate that they were 12 per cent larger in June.

For the five months ending May 31, the net railway operating income of the class I railways was $126,167,043, or 2.75 times as large as in 1938.

In these same five months, the railways purchased $192,584,000 of material and supplies, exclusive of fuel and equipment, an increase of $49,111,000, or 34 per cent, over the expenditures for the same purpose in 1938. They ordered from manufacturers new locomotives and cars to the amount of $39,936,000, or $27,156,000 more than in 1938.

Referring more specifically to maintenance of way, expenditures for the first five months totalled $174,933,933, an increase of $15,370,833, or 9.6 per cent. In May this increase was more than 11 per cent. Incidentally, this increase is at the rate of more than $120,000 per working day.

Since October 1, 1938, they have ordered approximately 750,000 tons of rails for laying this year, as compared with 440,000 tons last year. Similarly, the number of men employed in maintenance of way activities in June was 16.15 per cent larger than in June, 1938.

I believe that you will share with me the feeling that these figures are significant of the recovery that is taking place in railway, and especially in maintenance of way, activities, a recovery that still has a long way to go but that is headed in the right direction.

Yours sincerely,

Elmer T. Howson

ETH:EW

Editor

Note-All comparisons are for corresponding periods.


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AUGUST, 1939

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Railway Engineering and Maintenance

Highways

Two Public Officers Point to Dangers

"THE unprecedented extension of fine highways, simultaneously with a marvelous development of motor vehicles, has provided a vast quantity of new transportation, not only where previously existing transportation was inadequate and where extension was warranted, but also where it was adequate or even excessive. One of the vital factors to be kept in view in the future if we are ever to have a sound national system of transportation is the application of the test of public convenience and necessity to every substantial extension of the existing transportation facilities.

"That test has been applied to interstate railroads only since the Transportation Act of 1920. Failure to apply it earlier accounts for some of the most serious railroad situations in the country, where unwarranted duplication of lines has resulted in the destruction of some and the improverishment of all. Future extensions of highways and waterways especially will have a similar disadvantageous effect on all other agencies of transportation if they are not subjected to that test.

"Highways once built, will and should be used, but if built to excess their use for common carrier purposes will injure all agencies now in use, and accelerate the abandonment of many more thousands of miles of railroads, and possibly cripple competing highways and waterlines as well."

An Outside Viewpoint

This statement was not made by a railway officer or by a railway employee who saw the security of his industry and of his own position endangered. It was made by Balthasar H. Meyer a few days following his retirement on May 1, after serving as a member of the Interstate Commerce Commission for more than 28 years, the longest service ever rendered by a commissioner. In this period Commissioner Meyer had seen the development of highway transportation from the standpoint of one charged with the protection of the public interest, and it was from this standpoint that he noted with so much concern the undermining of railway service that is taking place and the far-reaching effect on public welfare that will result if this unfair and unwise encroachment of highway transportation on the traffic of the railways is not brought under control.

Approaching the subject of highway transportation from a different angle, we quote from another speaker: "Our present highway policy is not only helping to bankrupt the taxpayers in this state, but it is one of the main factors contributing to the placing of one-third of the railroads in the hands of receivers. There never has been any real justification offered for the building of so expensive a road system as the present concrete roads except to provide a right-of-way for heavy freight on trucks.

"I have always felt that the present policy of not only Wisconsin but of several other states that are attempting to finance this program will ultimately lead to their bankruptcy. During many years nearly 40 per cent of our state budget has gone into highway construction, and yet the local units of government never have received more than from 8 to 14 per cent of their cost. A single heavy truck traveling on a town road at certain times of the year will ruin it, while even in dry weather it is next to impossible to keep a gravel road in repair."

A Business-like Approach

This statement was made by Daniel W. Hoan, Socialist mayor of the City of Milwaukee, Wis., for more than 23 years, in which capacity he has given the country an outstanding example of the practical, business-like manner in which the affairs of a large municipality can be administered. From this background of interest in the public welfare Mayor Hoan joins Commissioner Meyer in deprecating the present widespread expansion of highway construction and utilization.

These quotations are highly significant of the appreciation that is developing in the minds of our keenest students of public welfare of the effect of the duplication of transportation facilities, a duplication that is made possible through the expenditure of vast sums of taxpayers' money and that is not only threatening the stability of the railway industry but is also threatening dire consequences on the public itself. Disassociated as these men are from any interest in the railways, and trained in the public point of view through long years of service to the public, their conclusions are specially significant, and to railway employees specially heartening, for they add to the contentions of these employees the further causes for public concern because of the undermining of essential

railway service and the staggering indebtedness that is being placed on taxpayers, to say nothing of the costs for the replacement of highways being destroyed prematurely by trucks. The disinterested point of view of these public officers may well be emphasized by railway employees among those with whom they come in contact.

Power Tools

Is the B. & B. Department Lagging?

HAVE the men responsible for maintaining the roadways and tracks of the railways been more progressive and equipment-minded than those in charge of the maintenance of their bridges and buildings? With due consideration to the special factors involved, it would appear that the answer to this question must be in the affirmative. For the last 10 or 15 years most track maintenance officers have shown a marked interest in the development and use of power tools and equipment to increase the efficiency of at least the more important items of their work, while the lack of power tools among many bridge and building gangs is evidence that many of the men in charge of bridge and building maintenance work have not shown the same aggressiveness in adopting mechanical aids!

It is true that a few roads have given more than ordinary attention to the proper equipping of their bridge and building forces to promote the greatest efficiency in their work, as is indicated in the report on power tools for bridge maintenance, presented before the last convention of the American Railway Engineering Association, and abstracted in this issue. It is true also that, taking the roads as a whole, they are employing a wide variety of power tools and equipment in carrying out bridge and building operations, but it is just as clearly evident that many roads have not yet taken full advantage of the increased efficiency possible through the use of power tools for these classes of work, and that, as a result, many bridge and building gangs are still carrying out their work with much less than the maximum economy possible. Even the power-operated saw, a tool of unquestioned value for heavy cut-off and ripping work, does not form a part of the equipment of many large gangs, while many gangs must also still rely upon the almost primitive hand wimble for boring thousands upon thousands of bolt and lag screw holes, with the expenditure of six to eight times as much time as required with modern power-driven drills or augers.

It is true that, unlike many major items of track work which involve the constant repetition of identical operations, most bridge and building maintenance is made up of operations which do not follow one another with any degree of regularity, thus frequently making it more difficult to organize the work to the point where the same degree of efficiency can be secured from the use of power tools and equipment. It is a fact also that, throughout the years of the depression, many higher maintenance officers have, of necessity, directed their attention more largely to the track structure and to its economical maintenance, which, quite naturally, has focused their attention more directly upon equipment designed to promote economy and efficiency in track work. However, a large amount of bridge and building work is still being done on the railways, the economic performance of which they cannot afford to overlook. Furthermore, the experience of at least a few roads has demonstrated conclusively that, in spite of the diversity of operations in many classes of bridge and building work, bridge and building forces, and the methods which they employ, can be so adjusted as to make effective use of power tools. This latter thought was clearly reflected by the A.R.E.A. committee in compiling its report on this subject, as is brought out in the conclusion of the report, that "further mechanization of all bridge and building work offers worth-while possibilities for increased economies."

Bridge Ties

Should They Be Renewed Out of Face?

IN any lot of crossties that are cut at the same time, in the same locality, and from the same wood; that are seasoned under identical conditions and are given the same preservative treatment; and that are installed out of face in the same track, say in a new line, there will be a wide range in the service life obtained from individual ties in the lot. Ignoring the matter of external damage, as from derailments or fire, in the normal course of events it may be expected that early failures will begin at any time within 5 to 10 years after installation, and that subsequent failures will take place over a long period. Under these conditions no track maintenance officer would consider it good policy to renew these ties out of face when they begin to fail, or at any time thereafter, for he knows from experience that the average life of the entire lot will not be reached until approximately 55 to 60 per cent have failed and that the ties having the longest service life may last as long as 35 to 40 years. He also knows that the history of any other lot of ties will be the same, even though they have not been produced and installed under the identical conditions that were assumed.

Bridge ties do not differ from crossties in these characteristics of service life, although the conditions of their use is somewhat different. Formerly, when timber was cheap, it was the almost universal custom to renew bridge ties out of face when they began to fail, and in some quarters the practice is still followed, despite the fact that much good timber is wasted in so doing, for ties that are removed from bridge decks during renewals are seldom reused for the same purpose. Where this is done, the practice is justified on the ground that in most cases the new ties have not completed their seasoning shrinkage when they are installed and are not, therefore, suitable for spot renewals. In other words, it is claimed that if spot renewals are to be made, and the new ties are sized to correspond with the depth of the ties that are to remain in the deck, they will not carry their part of the load when they have completed their shrinkage. If, on the other hand, allowance is made for the shrinkage that it is assumed will occur, until this shrinkage is completed the new ties will be compelled to carry the load that should be borne by the adjacent ties, with the result that they may fail from crushing. Another objection that is raised to spot renewals is that because of the uneven bearing of

the rail on the ties, the track always rides rough where such renewals are made, and that it cannot be kept in good line and surface when such a condition exists.

Today, bridge ties represent a much greater investment than formerly, particularly if they are treated, and no railway can afford to discard a treated tie that is fit for further service. To overcome the objections to spot renewals that have been cited, not a few roads have adopted the expedient of removing out of face at some selected point as many ties as the number requiring renewal and of replacing them with an equal number of new ties. The ties thus removed are then used in making the spot renewals. The advantages of this method are that the new ties are kept in one place, continuous sections of the deck have ties of the same age, timber is conserved and the inherit difficulties with respect to line and surface in spot renewal work are eliminated.

Stone Masonry

Why Not Solidify and Save It?

AMONG the outstanding monuments to early railway construction engineers that still remain throughout many sections of the country are the bridge abutments, piers and arches constructed of cut stone masonry. In many cases these were outstanding structures of their times, and, important as they were when built, they have become increasingly noteworthy as they have stood up decade after decade, in most cases carrying loads and withstanding impacts far in excess of any that might have reasonably been foreseen by their builders.

But even these structures that have served so well are facing their "day," a day that will be hastened unnecessarily if they are deprived of proper care and actual strengthening where such is found to be necessary. The weakness of many of these old structures, even of those ranked as among the most outstanding, has been due most frequently to the disintegration of the lime or natural cement mortar used originally in bonding the stones together. Especially where subject to excessive weathering, water action, freezing and thawing, or the infiltration of moisture, disintegration of the mortar has been particularly severe.

Where this disintegration has been evident from the surface, it has usually been remedied by raking out the joints and repointing them with a more stable Portland cement or cement-lime mortar, in some cases under air pressure to produce a new deep mortar bed. However, only in recent years have a few roads given much attention to the interior of these structures, where the deterioration of the old mortar, if there ever was any mortar throughout the body of the structure, has frequently extended to the point where the interior appears to be a mass of rubble or spalls, with no binder within itself or between it and the face stones. Where this condition has been found, and it has been found repeatedly, the interiors have been solidified and bonded with the facia courses by internal grouting, either under pressure or by gravity. In fact, the procedure for carrying out this class of work has been so advanced in recent years, frequently involving the use of non-shrink grouts to insure compactness and the exclusion of moisture, that the repaired structures are as strong or stronger and more durable than the original structures.

This is a class of repair that should not be overlooked, because it is entirely possible, and frequently the case, for masonry structures to appear much stronger than they actually are. Aside from this important aspect, the internal solidifying of old masonry acts to prolong greatly the service life of these structures at only a fraction of the trouble and expense required to replace them.

Raising Track

What Factors Indicate the Need for Ballast

AT this season maintenance officers are beginning to consider the work that should be included in their budgets for next year. One of the important items to be decided is the amount of track that should be reballasted. Several factors are involved in arriving at this decision, among them that of the depth of the existing ballast, that is, whether it is sufficient to give the track adequate support to stand up under the traffic loads imposed upon it. Obviously, it is impossible to maintain good track unless it has adequate support.

Ballast renewal is called for if the existing material has deteriorated from exposure or is too soft to withstand tamping. The new ballast should be of good quality, practically unaffected by exposure and resistant to the impact of tamping tools. Material that disintegrates from any cause soon becomes foul and unfit for use as ballast. All ballast fouls through use and thus retards drainage, causes churning ties and sloppy track and, if its use is continued, water pockets in the roadbed. Some kinds of ballast can be cleaned, and where this is practicable a complete application of new ballast can be avoided. Where this cannot be done, the dirty ballast should be removed from the cribs and thrown away, and the track given a raise on new ballast.

If tie renewals have been deferred for any considerable time, it is likely that a general surfacing will be needed in connection with the replacement of the ties, and this usually calls for a renewal of the ballast. Not a few maintenance officers favor giving the track a general surfacing about every three or four years. If only a light raise is given, this can be done once or twice without calling for additional ballast, but after this a partial application of new ballast will be necessary.

In general, track has been worked out of face less frequently during the last ten years than formerly, with the result that today a great deal of it now rides dead or exhibits a tendency to become center bound, and much of it requires an excessive amount of smoothing to keep it in good riding condition. The only remedy in this case is a general surfacing, and this can be done in many instances without a complete renewal of ballast.

Where any of the foregoing conditions exist, it is desirable to re-ballast the track in whole or in part. Track that has become foul or that has laid too long on an old bed cannot be kept in good riding condition in any other way. In the long run, keeping the ballast clean and the track resilient reduces maintenance costs enough to offset the cost of renewing or partially renewing the ballast.

Smooths High

Grinding Down the High Areas of the Hardened Ends of the Rails on the Milwaukee Division

SURFACE grinding rail ends to reduce their height to that of the remainder of the rail is a reversal of the usual practice of building them up by welding to bring them into conformity with the running surface. Yet this is what the Chicago, Milwaukee, St. Paul & Pacific found it desirable to do on 50 track miles of its double-track line between Chicago and Milwaukee, Wis.

Beginning about 1927, this road experimented in both the laboratory and the field with the heat treatment of rail ends, with the idea that by increasing the hardness of the area of the running surface immediately adjacent to the joint, rail-end batter could be minimized, or possibly eliminated. By 1931, the process had been so far perfected that it was applied to all new rail that was laid during this year, the heat treatment being applied in the field after the rail was in the track, for at that time there were no facilities for hardening the ends at the mill.

Ends of Old Rail Hardened

A survey made early in 1931, of the rail on the Milwaukee division disclosed that the 130-lb. rail which had been laid in 1927, 1928 and 1929, while showing incipient batter, had not reached the stage where welding could be justified. It was considered desirable, therefore, to apply heat treatment to the ends of this rail to arrest further progress of the batter that was definitely occurring.

It had been disclosed by the survey that the batter at the joints in the 1927 and 1928 rail averaged between 0.025 and 0.030 in., with only minor variations above and below the average, and that practically all of the measurable depression was on the ends of the receiving rails. In general, the batter on the 1929 rail, of which only a small amount was laid, averaged less than 0.020 in. Although the heat treating of rail ends was then in its infancy, the development work that had preceded its application as a general practice had indicated the desirability of cross grinding, and all joints were cross ground in advance of the heat treatment.

By 1936, some chipping had occurred, and in that year a welder was sent over the division to restore the chipped ends, and was instructed to cross grind any joints that needed this attention, but only a few such joints were found. At the same time, a cursory examination indicated that batter had not yet progressed enough to justify welding, except where chipping had occurred.

Another survey of the rail was made in the summer of 1937, to determine the condition of the ends. The rail was then 10 and 9 years old, respectively, ignoring the small amount laid in 1929, and it was 6 years since the ends had been hardened. Careful measurements disclosed that, with only a few exceptions, the hardened area was raised slightly above the adjacent untreated area. This difference in height was not enough to warrant any action at this time, although it was decided that the logical thing to do would be to grind the hardened areas to bring them down to the same elevation as the remainder of the rail.

Survey Repeated in 1938

This survey was repeated in 1938, and while the hardened areas were relatively higher than in 1937, the condition was not yet such as to make grinding either necessary or desirable. When the measurements of the relative heights of the hardened and unhardened areas for the two years were charted, it became plain that the difference in height resulted from progressive wear on the unhardened portion, with relatively less wear on the hardened area at the rail ends. Measurements of the actual height of the rail, made in 1937 and 1938, confirmed this conclusion. The height of the hardened ends above the adjacent running surface varied from 0.028 in. to 0.073 in., with the majority of the joints well inside these limits. There was a measurable amount of batter at practically every joint, this being invariably on the receiving rail, yet in all but a few cases the low spot of

Hardened Rail Ends By Grinding

Reversing the usual practice of building up rail ends, the Chicago, Milwaukee, St. Paul & Pacific was recently confronted with a situation that made it necessary to grind down the ends of 50 miles of rail that had been heat treated in 1931. The investigations that preceded this work and the methods employed are described in this article, as are the methods employed in eliminating differences in height of cropped, released rail laid in secondary service

Close Control of the Feed for the Grinding Wheel Was Maintained at All Times to Insure a Smooth Surface Through the Joint

the batter depression was at a level above the general surface of the unhardened portion of the rail.

Joint Bars Investigated

The investigation also included the condition of the joint bars, the original bars applied when the rail was laid still being in service. The joints are of the supported type, being carried on three ties, the middle tie being directly under the rail gap. The bars are of the six-hole toeless design, 36 in. long. The bolts were tightened by hand when the rail was laid, and were re-tightened with power wrenches in 1931, 1934 and 1938.

It was found that fishing wear, that is, the combined wear on the fishing surfaces of the rail and the bars, while detectable, had not progressed to the point where replacement of the joint bars was desirable, or sufficient to warrant joint shims. The fishing clearance at the ends of the rail on both the leaving and receiving rails ranged from 0.005 in. to 0.010 in., and the remaining draw, as nearly as it could be determined, varied from 0.030 in. to 0.040 in.

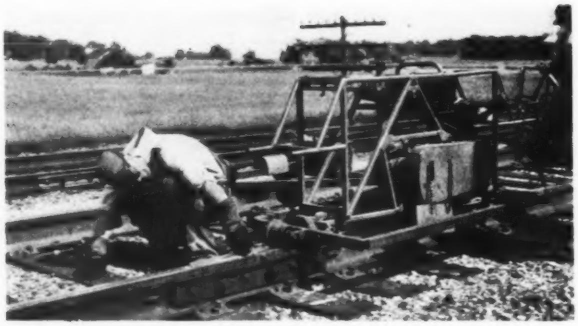
High Spots Were Ground Down

Observation showed that the high areas did not affect the riding qualities of the track. On the other hand, it was obvious that the point would be reached soon where the impact of the moving wheels would accelerate the wear on the fishing surfaces and probably result in secondary batter on the rail. From the data gathered during the two successive surveys, it was considered that this point would be reached in 1939. Accordingly, a gang was organized to do the grinding and was put into the field early in May. The equipment consisted of two Nordberg C. G. precision grinders and one Nordberg cross grinder. The precision grinders were specially adapted for this work by reason of the fact that the feed for the grinding wheel can be controlled to 0.0025 in. and the grinding wheel can be oscillated to conform to the contour of the running surface of the rail. The gang consisted of a foreman, who also operated one of the precision grinders, an operator for each of the other two grinders, and a general utility man who also did the flagging when necessary.

Keeping in mind that the measurements that have been given were recorded in 1937, and that the rail had worn approximately 0.010 in. more before it was ground, with less than 0.001 in. additional wear on the hardened areas, in general, when the islands of hardened material were ground down to the elevation of the adjacent unhardened portion of the rail, the depression caused by batter on the receiving rail was also ground out. This was not always the case, however, as will be explained.

Heat Treatment Uniform

When the ends of this rail were hardened, there was no background of experience to guide the technic of heating, quenching and drawing the metal, except that gained during the development of the process, and since much of the development work took place in the laboratory, it became necessary to develop a technic for the field and to educate the torch men to it. In view of this lack of experience in the field application of the process on a large scale, as well as the necessity for educating the men actually engaged in applying the



The Work Was Checked Carefully to Insure the Correct Gradient

heat treatment, a remarkable uniformity in the quality of the hardened areas was obtained.

Despite this general uniformity, an occasional joint was found in which the Brinnel hardness was well below the average of 450, which is the approximate hardness of the remaining joints. This is accounted for by the fact that through the lack of experience that has been mentioned, the control of the heating, quenching and drawing of the metal was not as close as it became later, and some torchman failed to harden the metal properly, or drew it too far after it was quenched. Whatever the cause, an occasional joint was found at which considerable batter had occurred, with the depression well below the remainder of the running surface. At such joints, the rail was ground to the bottom of the depression and a runoff was ground in both directions from this low point, on a gradient of 0.003 in. per lin. in.

Each of the operators of the precision grinders was equipped with a 20.-in. straight edge and a feeler bar reading to thousandths of an inch. As the grinding progressed, observations were made to determine the amount of grinding still necessary, readings being taken at several points across the head to insure that when the joint was finished the surface was smooth and that all points were at the same elevation as the remainder of the running surface. Following the surface grinding, all joints were cross ground.

A Mile a Day

As the depth of the treatment extended about ¼ in. below the original surface, no joints were found where the grinding cut through the shell of hardened metal. The grinding progressed at the rate of approximately a mile of track a day, this varying somewhat between the northbound and southbound tracks, owing to some difference in the number of trains passing during the working hours. The cost of the work averaged $0.17 a joint.

Grinds Cropped Rail Ends

When the Milwaukee releases rail from its main-line tracks, it is shipped to its rail reclamation plant at Savanna, Ill., where it is classified for reuse. All rail classed as Number 1 relayer is cropped 1 in. back of the joint bars and redrilled. Eighteen miles of such rail, released from the Illinois division, between Chicago and Savanna, was laid during June on the Madison line from Watertown, Wis., to Deansville. Although this is a single-track secondary main line, it carries important freight and passenger traffic.

The rail in question, which was of the 100-lb. R. A. section, was laid variously from 1920 to 1924, with 24-in., 4-hole angle bars. An average of 5,000,000 gross tons of traffic had passed over this rail annually during its period of primary service, so that there was a difference of about 25,000,000 tons between the 1920 and the 1924 rail. Aside from the fact that all rails do not wear at the same rate, even under identical conditions, it is obvious that there was considerable difference in the amount of wear in the individual rails.

Rails Not Hardened

Since cars of released rail seldom reach the reclamation plant in the order in which they were loaded, and since the several classifications that are made separate the rails as they are received into individual lots, it is impracticable to match the rails, even approximately, as they were originally in the track. For this reason, and because of the difference in wear, secondhand rails always exhibit considerable difference in height. In this case the difference in the height of adjacent rails, as they were laid, ranged from nothing to 0.050 in., with an average difference of 0.025 in. to 0.030 in. This rail was laid with new angle bars and the bolts were tightened with power bolting machines.

In recent years, it has become the practice on the Milwaukee, when laying cropped rail, to grind a runoff from the high to the low rail, and to harden the ends. It is also the practice to surface both new and released rail as soon as it is laid, generally by giving it a ballast raise. It is also customary to wait until after the ballasting is completed to grind and harden the ends of the rails. In this case, however, it was impracticable to arrange the ballasting schedule so that the track on the Madison line could be raised earlier than September, and since this would give an interval of about three months between the laying and the treatment of the rail, it was considered preferable to grind and harden the ends at once.

Accordingly, as soon as the grinding gang completed its work on the Milwaukee-Chicago line, on June 30, it was transferred to Watertown, to work west from that point, and was augmented by a welder and a helper with equipment for hardening the rail ends. The grinding equipment was the same as was used on the Milwaukee division. On the Madison line, the purpose of the grinding was to bring the ends of the abutting cropped rails to the same elevation by grinding down the high rail, at the same time providing a ramp with so light a gradient that there will be no jump as the wheels pass from the higher to the lower elevation, or impact as they move in the opposite direction. A gradient of 0.003 in. per lin. in. was chosen as fulfilling this requirement.

How the Rail Was Ground

Prior to setting the grinder over the joint, the operator tested it with a straight edge, and if necessary with the feeler-gage bar, to determine the difference in the height of the adjacent rails. Obviously, this difference determined the length of the area to be ground. The grinder wheel was then set over the end of the rail and worked longitudinally over the required longitudinal distance. At the same time, the frame was oscillated laterally to insure conformity with the contour of the rail.

As has been mentioned, the feed

of the grinding wheels on these machines is susceptible of control to 0.0025 in., so that with reasonable care the operators experienced no difficulty in conforming to the desired gradient. To insure that they were getting a uniform gradient and a smooth surface, tests were made at intervals with the straight edge until the joint was finished. In general, where the difference in height of the adjacent rails was close to the average, 0.025 to 0.030 in., it was possible to complete a mile a day, that is, 170 to 175 joints, for each machine. Where the difference was at the maximum, 0.050 in., the rate was slowed down to about 130 joints.

1—Grinding Cropped Rail. The Grinding Wheel Was Oscillated to Maintain the Contour of the Head

2—The High Rail Was Ground Down to Provide a Ramp Having a Gradient of 0.003 In. Per Lin. In. of Length

3—After the Rails Were Ground the Ends Were Heated With a Twin-Tip Torch to 1,400 Deg. and, 4—Were Quenched With One Pint of Water. 5—Cross Grinding the Rail Ends Completed the Operation

Method of Hardening

Following the precision grinders, the rail ends were heat treated, propane being used as the heating medium for the hardening process, the flame being delivered to the surface of the rail through an ordinary welding torch equipped with specially designed twin tips. Propane burns with a flame temperature of about 4,200 deg. F., and it is the experience of this road that an application of 70 sec. duration is sufficient to produce a surface temperature of 1,400 deg. in the metal. In applying the heat, the flame is moved laterally across the head of the rail, and longitudinally a sufficient amount to insure that it will impinge directly on the surface for a distance of ¾ in. back from the ends.

As soon as the desired temperature was obtained, the metal was quenched with one pint of water. This was delivered to the heated area by allowing the water to flow through a special arrangement of holes in the bottom of the pint can, that gives a specified rate of temperature reduction in the metal. This temperature of heating and rate of quenching make unnecessary any provision for reducing the brittleness of the metal, since the rate of quenching with the water and the heat conductivity of the underlying metal do the annealing. The hardened zone extends ¾ in. back from the end of the rail and to a depth of from 5/16 to ⅜ in. As soon as the heat treatment was completed the joints were cross ground.

The investigation preceding the grinding down of the high rail ends on the Milwaukee division were conducted by C. E. Morgan, superintendent of work equipment and welding, under the general direction of W. H. Penfield, chief engineer. Mr. Morgan also exercised supervision, over the grinding and heat-treating operations on both lines.

The Treatment of Ties Was Off Relatively Less Than That of Timber Generally

Wood Preservation Slips Slightly in 1938

Reflecting the recession in industrial and economic activities which took place in 1938, wood preservation declined slightly from 1937. Despite this setback, however, the volume of wood treated in 1938 has been exceeded in only 8 of the 30 consecutive years that complete records of the output of the wood-preserving industry have been compiled. The railways continue to be the best customers of this industry, using more than 75 per cent of all of the wood treated throughout 1938

THERE was a slight setback in 1938 in the progressive gains that have been made by the wood-preserving industry from 1934 to 1937, inclusive. In 1938, a total of 244,221,442 cu. ft. of timber was given preservative treatment, a decrease of 21,572,744 cu. ft. or 8 per cent, compared with the quantity treated in 1937, according to figures compiled by R. K. Helphenstine, Jr., Forest Service, United States Department of Agriculture, in co-operation with the American Wood-Preservers' Association. While this volume is only 67.5 per cent of the quantity treated in 1929, the peak year for the industry, it should not be overlooked that the volume treated in 1938 was large, having been exceeded in only 8 of the 30 consecutive years that these figures have been compiled.

For statistical purposes the material treated year by year is divided into eight classes, and in 1938 all of these eight classes showed decreases, compared with 1937, ties declining relatively the least, slightly more than 0.4 per cent; cross arms, which had the smallest quantitative decrease, decreased relatively by 52.8 per cent; switch ties decreased 8.7 per cent; piles, 28 per cent; poles, 16 per cent; construction material, 16.6 per cent; and miscellaneous material, 6.8 per cent.

As in all previous years since the beginning of the wood-preserving industry, the railways maintained their position as the principal consumer of treated timber. The volume of crossties alone represented 55 per cent of the total amount of timber treated, while crossties and switch ties combined made up 58.4 per cent of the total. Including piles, poles, crossing plank and other timbers, the railways used more than 75 per cent of all the timber treated last year.

A total of 44,598,678 crossties were given preservative treatment in 1938, representing a total volume of 133,796,034 cu. ft. Numercially, the decrease was 204,561 ties, or 0.4 per cent. As in 1937, oak ties ranked first in number, with a total of 20,669,897, or slightly more than 46 per cent of the total. Southern pine maintained second place, with 9,476,964 ties, or more than 21 per cent of the total, and Douglas fir ranked third, with 4,108,764, or 9 per cent. Other woods included gum, maple, ponderosa pine, lodgepole pine, birch, tamarack, beech, hemlock and elm in the order named, this group representing 21.8

Treatment of Miscellaneous Material (Ft.b.m.)

	1938	1937	1936	1935
Lumber	116,640,856	118,258,910	73,694,898	49,705,675
Fence posts	14,206,465	15,985,256	12,266,798	9,564,829
Tie plugs	788,781	870,486	1,238,326	1,332,533
Crossing plank	807,684	1,379,114	1,364,035	290,059
Car lumber	None	137,544	148,332	227,826

Crossties (Number) Treated by Kinds of Woods and Kinds of Preservatives—1938

Kind of wood	Creosote (1)	Creosote-petroleum (2)	Zinc chloride (3)	Wolman salts	Zinc-meta-arsenite	Miscellaneous preservatives	Total	Per cent of total
Oak	16,367,773	4,295,107	6,417	600	....	....	20,669,897	46.35
Southern pine	6,449,280	2,988,835	27,980	4,669	....	6,200	9,476,964	21.25
Douglas fir	85,892	3,898,429	79,077	1,546	....	43,820	4,108,764	9.21
Gum	2,255,685	402,154	....	341	....	....	2,658,180	5.96
Maple	509,243	717,430	243,007	....	....	....	1,469,680	3.30
Ponderosa pine	....	1,467,718	....	....	....	....	1,467,718	3.29
Lodgepole pine	....	1,049,567	332,475	....	....	....	1,382,042	3.10
Birch	295,083	458,285	157,255	....	....	....	910,623	2.04
Tamarack	....	578,526	222,798	....	4,493	....	805,817	1.81
Beech	131,014	419,331	129,253	....	....	....	679,598	1.52
Hemlock	....	80	212,080	....	....	....	212,160	0.47
Elm	100,000	56,583	306	....	....	....	156,889	0.35
All other	323,826	276,520	....	....	....	....	600,346	1.35
Total	26,517,796	16,608,565	1,410,648	7,156	4,493	50,020	44,598,678	
Per cent of total	59.46	37.23	3.17	0.02	0.01	0.11	100.00	100.00

(1) Includes distillate coal-tar creosote, solutions of creosote and coal-tar, water-gas tar and water-gas-tar solution.
(2) Includes various percentage mixtures of creosote and petroleum.
(3) Includes chromated zinc chloride.

per cent of the total, while all other woods than those named aggregated only 600,346 ties, or 1.35 per cent of the whole number treated.

Of the total number of ties treated last year, 26,517,796, or approximately 60 per cent, were treated with straight creosote or with creosote and coal tar; 16,608,565 ties, or 37 per cent, were treated with mixtures of creosote and petroleum; and 1,407,271, or 3 per cent of the total, were treated with zinc chloride; while miscellaneous preservatives accounted for only 0.15 per cent of the total number treated. All crossties given preservative treatment in 1938 were subjected to pressure processes. Of the total number of crossties treated during the year, 31,486,525, or 70.5 per cent, were bored and adzed before treatment, compared with 30,962,608, or 70 per cent, in 1937; 2,701,234 were bored but not adzed; 1,125,381 were adzed but not bored; while 9,285,538, or 21 per cent were neither adzed nor bored. This latter figure compares with 11,086,324, or 25 per cent, that were not bored or adzed in 1937.

The quantity of switch ties given preservative treatment in 1938 amounted to 105,352,119 ft. b.m., representing a decrease of 10,025,486 ft. b.m., or 8 per cent under the quantity treated in 1937. Here also, oak was in first place with respect to the volume treated, the total for the wood being 59,783,992 ft. b.m., or 57 per cent of all switch ties treated. Douglas fir regained second place with 12,870,339 ft. b.m., or 12 per cent; while Southern pine returned to third place with 11,949,226 ft. b.m. or 11 per cent. Gum accounted for 9,980,174 ft. b.m., or 9.5 per cent; while maple fell back into fifth place with 7,834,104 ft. b.m. The remaining 3 per cent was made up of tamarack, birch, beech, and elm, in the order named, and a few miscellaneous species.

Piles Less by 28 Per Cent

A decrease was registered in piling treated, from 17,697,920 lin. ft. in 1937, to 12,751,961 lin. ft. in 1938, a reduction of 4,945,959 lin. ft., or 28 per cent. Southern pine piles ranked first with 10,813,401 lin. ft. or 85 per cent of the total; Douglas fir was second with 1,496,068 lin. ft., or 12 per cent; while oak ranked third with 350,720 lin. ft. or slightly less than 3 per cent. The remainder consisted principally of ponderosa pine, with small amounts of Norway pine and cypress. All piles treated in 1938 were impregnated by pressure processes, and all but 19,162 lin. ft. were treated with creosote or creosote mixtures.

Reflecting the decrease in the volume of wood treated, the wood preserving industry consumed 166,183,891 gal. of creosote, 17,390,690 gal., or 9.5 per cent, less than in 1937. It should be noted, however, that this consumption has been exceeded only in 1937 and in each of the six years from 1925 to 1930 inclusive, and was only 60,190,336 gal. below that of 1929, the peak year in wood preservation. The consumption of foreign creosote decreased 4,768,633 gal., to 30,457,148 gal. The consumption of zinc chloride (3,010,489 lb.) and chromated zinc chloride (1,819,101 lb.) together amounted to 4,829,590 lb., a decrease of only 4,345 lb., compared with 1937.

Indicating the growing use of creosote-petroleum mixtures, the wood-preserving industry consumed 26,741,677 gal. of petroleum in 1938, an amount that has been exceeded only twice, in 1929 and 1930, the peak

(Continued on page 471)

Wood Preservation, 1909-1938
Together with Consumption of Creosote and Zinc Chloride

Year	Total material treated, cu. ft.	Number of crossties treated	Creosote used, gal.	Zinc chloride used, lb.*
1909	75,946,419	20,693,012	51,426,212	16,215,107
1910	100,074,144	26,155,677	63,266,271	16,802,532
1911	111,524,563	28,394,140	73,027,335	16,359,797
1912	125,931,056	32,394,336	83,666,490	20,751,711
1913	153,613,088	40,260,416	108,373,359	26,466,803
1914	159,582,639	43,846,987	88,764,050	27,212,259
1915	140,858,963	37,085,585	84,065,005	33,269,604
1916	150,522,982	37,469,368	96,079,844	26,746,577
1917	137,338,586	33,459,470	83,121,556	26,444,689
1918	122,612,890	30,609,209	56,834,248	31,101,111
1919	146,060,994	37,567,927	67,968,839	43,483,134
1920	173,309,505	44,987,532	70,606,419	49,717,929
1921	201,643,228	55,383,515	77,574,032	51,375,360
1922	166,620,347	41,316,474	87,736,071	29,868,639
1923	224,375,468	53,610,175	128,988,237	28,830,817
1924	268,583,235	62,632,710	158,519,810	33,208,675
1925	274,474,539	62,563,911	169,723,077	26,378,658
1926	289,322,079	62,654,538	188,274,743	24,777,020
1927	345,685,804	74,231,840	221,167,895	22,162,718
1928	335,920,379	70,114,405	222,825,927	23,524,340
1929	362,009,047	71,023,103	226,374,227	19,848,813
1930	332,318,577	63,267,107	213,904,421	13,921,894
1931	233,334,302	48,611,164	155,437,247	10,323,443
1932	157,418,589	35,045,483	105,671,264	7,669,126
1933	125,955,828	22,696,565	85,180,709	4,991,792
1934	155,105,723	28,459,587	119,049,604	3,222,721
1935	179,438,970	34,503,147	124,747,743	4,080,887
1936	222,463,994	37,952,129	154,712,999	4,127,886
1937	265,794,186	44,803,239	183,574,581	4,833,935
1938	244,221,442	44,598,678	166,183,891	4,829,590

*Includes chromated zinc chloride.

Power Tools Gain Favor in Bridge Work

That the mechanization of bridge maintenance forces is taking place at an accelerated pace is shown by this survey of the progress that has been made to date, presented before the convention of the American Railway Engineering Association by a subcommittee of the Committee on Maintenance of Way Work Equipment, of which Jack Largent, supervisor of maintenance of way work equipment, Missouri Pacific Lines, at Houston, Tex., was chairman

There Are Few Bridge Jobs Where Power Tools Cannot Be Made Use of to Large Advantage

TO obtain information regarding the number and types of power tools that are in service in bridge maintenance and the manner in which such tools are assigned, a questionnaire was distributed among certain roads, to which replies were received from 16 carriers. Some replies indicated a heavy investment in a great variety of power units and tools aggregating several hundred units, and reflected a high degree of specialized application. Others showed that the adaptation of such equipment had progressed only to the point where one or two recently purchased power units equipped with a small complement of tools were in use, while in still other cases it was indicated that a study had only recently been made of the possible economies to be obtained by equipping one or more gangs with power-driven devices.

The diversity of conditions obtaining on the lines reporting is indicative of the relative newness of portable power-driven equipment in bridge and building work, and, except for a few leaders, it may be stated that it is only in the last decade that hand tools have been rapidly replaced by machines in this branch of maintenance work. The mechanization of bridge work on certain lines seems to have been an outcome of the use of pneumatic tie tampers for track work, the compressors being gradually utilized to drive pneumatic tools on large construction or repair jobs.

Air Tools First Used

Because of its broad range of utility, and more particularly, perhaps, because of its ruggedness, simplicity, and resistance to the effects of moisture, pneumatic equipment seems to remain most generally popular. The popularity of this type of equipment may be explained in part by the fact that in many instances it is desirable to carry on such work as drilling rock, breaking concrete, riveting, sandblasting and spray painting, in conjunction with the use of rotary tools in drilling, reaming, wood boring and nut running, and that not infrequently large quantities of air are employed in making shotcrete and pressure grouting repairs to concrete structures, or in placing concrete in tunnel linings. One major line in the West recently completed the renovation of a mile-long tunnel, in which six self-propelled track-mounted compressors were used to haul double-platform work cars, as well as for supplying air for drilling, chipping, shotcreting and grouting. Another factor to consider is that it is sometimes necessary to operate tools wholly or partially submerged in water.

Among the first tools to find general application in timber-trestle work were woodborers. The use of aluminum alloys has cut the weight of these tools to a minimum. Also, reports indicate the fairly rapid adoption of a rather recent innovation in pneumatic nut runners built on the impact principle, which is available in three sizes for work on both timber and steel structures. Weighing but 26 lb., this tool spins free-thread nuts at about 700 r.p.m., and tightens or loosens them quickly

by rapid impacts. Because of freedom from both torque and vibration, this tool is remarkably safe and easy on the operators. Because of these qualities one western line is using this wrench extensively in driving and removing long lag screws used to secure the lagging for tunnel lining forms.

Other types of air wrenches that are proving useful include piston-type nut runners as well as multi-vane-powered tools of widely varying sizes. When equipped with a long chuck adapter, pneumatic wrenches are sometimes employed in setting screw spikes in locations across bridges where the track construction involves the use of lag spikes.

Reports indicate that a device enjoying wide popularity is the power saw of the link-chain type, which may be driven by either air, electric or gasoline power. This saw is used extensively in such operations as cutting off piling, framing bents, and removing old timbering from tunnels. Portable pneumatic circular saws, which cut to a maximum depth of 4⅛ in., and various electric and flexible-shaft types, have likewise found general application.

The answers to the questionnaire indicate that there is a developed or potential demand on most roads for both large and small machines. Specialized system floating gangs are usually provided with one or more large compressors and with portable lighting equipment, while there appears to be a recently accelerated demand for ultra-portable units for use by small division gangs in making routine repairs on both wood and steel structures. One road reports that it has supplemented a battery of large air compressors with several electric generating units driven by the large engines in heavy-duty motor cars, while another reports the use of numerous small and relatively inexpensive self-contained generators in operating timber-working tools.

The trend toward increased portability has been manifested in some instances by the utilization of small compressors, and there doubtless is a field for further development of this versatile unit of equipment. Two lines report the occasional use of air from steam-driven air pumps on pile drivers for operating woodborers and other tools.

Answers to the questionnaire reflect the increasing popularity of spray painting. In some cases large paint-spraying gangs are using air from lines supplying other tools, while a considerable number of small, self-contained paint-spraying units are used by small crews. A quite general adoption of mechanical vibration, on even the smaller foundations and structures, is reflected in the number of concrete vibrators reported, which are operated by either air, electric power or gasoline engines.

Relatively few tools of the flexible-shaft type were reported, this being due, perhaps, to the comparative newness of this type of drive, and to some difficulty in driving by this method large tools or those having a fluctuating load. The principal appeal of this method of power transmission appears to lie in its extreme portability, flexibility, and adaptability to various uses, all with a comparatively small investment.

The committee's study indicates that further mechanization of bridge and building work offers worthwhile opportunities for increased economies.

Air Drills and Arc Welding Equipment Are Used Extensively in Many Classes of Bridge Work

Wood Preservation Slips in 1938

(Continued from page 469)

years in wood preservation, during the 15 years that statistics of petroleum consumption have been compiled. As was done last year, Wolman salts (870,580 lb.) and zinc-meta-arsenite (194,953 lb.) have been segregated from miscellaneous preservatives and are shown separately. Restoring them to their former classification for purposes of comparison, 1,575,962 lb. of miscellaneous salts were consumed by the industry in 1938, a decrease of 4.5 per cent, compared with 1937. Miscellaneous liquid preservatives increased from 9,936 gal. in 1937 to 19,486 gal. in 1938, an increase of approximately 96 percent.

Treating Plants Increase

There was an increase of 6 in the number of treating plants in the United States in 1938, the number being 230 compared with 224 wood-preserving plants in 1937. Of these, 221 were in active operation, an increase of 12, the largest number ever recorded, and 9 were idle. Eight new plants were completed in 1938, of which 7 were placed in operation, 5 of these being pressure plants and 2 non-pressure (open tank). Six plants were abandoned, 1 pressure and 5 non-pressure. Of the total plants in existence, 181 were commercial plants that treat wood for sale or by contract; 23 were owned by the railways, this being the same as in 1937; and 26, or 3 less than in 1937, were owned by public utilities, mining companies, etc., to supply their own needs.

Milwaukee Re-roofs Old

Only a Relatively Small Section of the Shed Roof Was Uncovered at a Time In Order to Protect Trains and Patrons

WITHOUT the least interference with passengers or passenger train movements, the Chicago, Milwaukee, St. Paul & Pacific has carried out the complete renewal of the roof deck of its large passenger station train shed at Milwaukee, Wis., work which involved the repair or replacing of 152 structural steel supporting members, 1,000 rafters, about 150,000 ft. b.m. of roof sheathing and approximately 67,500 sq. ft. of roof covering. This entire job, which was done as a part of a general program for repairing and modernizing the old station at this point to put it in good condition and to better adapt it to present-day conditions, was started on April 20 and was completed on June 5, in 32 working days, by a force which varied in size from 9 to 50 men during various stages of the work. As a result of the repair operations, which were carried out at a cost which was relatively small as compared with any form of complete reconstruction which might have been undertaken, the road now has in its old train shed a structure which will afford many more years of satisfactory service.

Built in 1886

The train shed at Milwaukee, which was constructed in 1886, at the same time that the present passenger station at that point was built, is rectangular in plan, 556 ft. long by 92 ft. wide, with a simple, double-pitched roof, surmounted by a continuous, longitudinal clearstory or monitor at its ridge line. Its framework, which is entirely of structural steel, includes two longitudinal lines of box-section columns, with a span of 66 ft. between them; light roof trusses, spaced on 25-ft. centers, with arched lower chords affording minimum clearance of about 24 ft. above tracks; and eight lines of built-up, lattice-type purlins. The old deck of the shed consisted of 3-in. by 6-in. rafters supported directly on the purlins, on 2-ft. centers, covered by 1-in. by 6-in. D & M sheathing which, in turn, was protected by four-ply asphalt-saturated asbestos sheet roofing, laid in sections 8 ft. long by 3 ft. wide.

Glass Removed from Monitor

The monitor surmounting the roof, entirely for ventilation purposes, was of steel frame construction, with a roof deck similar to that of the shed roof proper, and with open-sash side faces. Originally, the sash faces of the monitor were glazed and all smoke exhaust was carried off through roof ventilators. However, a number of years ago all of the glass was removed as a hazard and as unnecessary, and in the interest of materially improving the roof ventilation. As a part of the recent deck renewal work, the old monitor was completely renewed as the steel frame-work showed excessive corrosion from moisture condensation and locomotive gases. This was replaced by a monitor employing frame construction throughout, and substituting continuous louvres along both sides for the old sash.

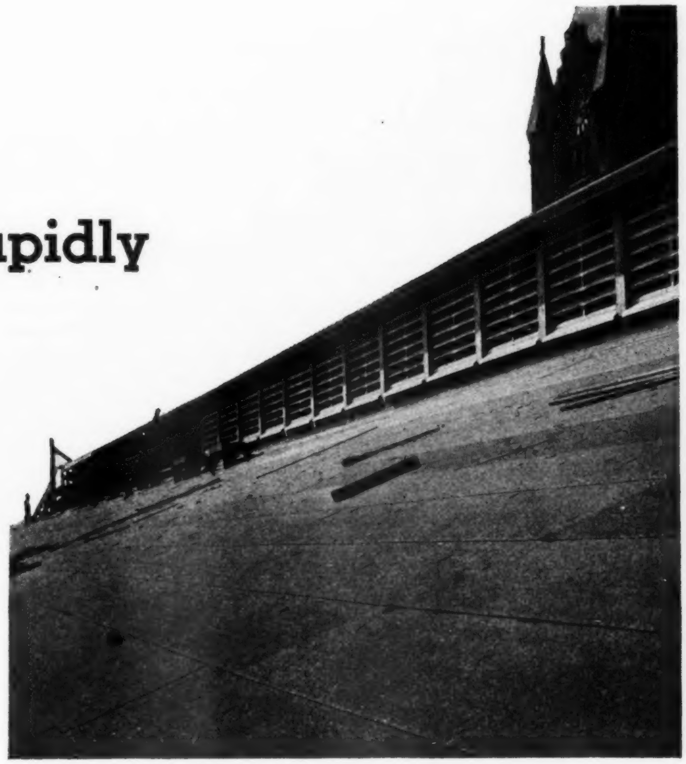
In renewing the shed deck proper, which included all rafters as well as all roof sheathing, advantage was taken of the opportunity afforded for repairing or renewing a number of

Looking Through the South Half

Train Shed

Rapidly

This article describes how the Chicago, Milwaukee, St. Paul & Pacific completely renewed the roof of the large train shed at its Milwaukee passenger station, in 32 working days, without interfering with the normal use of the shed. This work, done at a cost of $15,300, required the renewal of 1,000 rafters, 150,000 ft. b.m. of Douglas fir roof sheathing and 67,500 sq. ft. of roof covering



Wood Louvres Replaced Sash in the New Monitor

the truss top chord members and purlins, which showed structural weakness through corrosion. Practically all of these members were near the ridge of the roof where, like the monitor frame members, they were subjected to the most severe concentration of locomotive smoke and gases. At the same time, in the repair work, a uniformly sturdier deck was provided through the use of larger rafters and heavier sheathing.

of the Re-roofed Train Shed

The new rafters are 4 in. by 8 in., spaced 4 ft. center to center, and the new decking is 2-in. by 8-in. D & M sheathing. All of this material is Douglas fir, untreated, which was cut to size and kiln-dried at the West Milwaukee shops of the road. In the kiln-drying treatment, an average moisture content of 30 per cent was reduced to about 12 per cent.

Careful Procedure

The method of carrying out the deck renewal was predicated upon the important considerations of avoiding any hazards to train operation or to passengers and employees moving about at the track level, and of permitting a minimum of the shed area to be uncovered at any one time, especially throughout the main center section, where the maximum number of passengers and their friends and relatives congregate during the arrival and departure of trains. In view of these considerations, the work was carried out progressively from one end of the shed to the other, with the dismantling work proceeding only at such speed that it could be followed closely by the new construction. Thus, throughout the major part of the work, the dismantling operations and the deck renewal and roof covering operations were under way simultaneously.

The individual operations were relatively simple in themselves and largely uniform in character, but with the work being done directly over occupied public space, they had to be carried out with the greatest care. The only interruptions to normal work operations occurred while passenger trains were discharging and taking on passengers, when operations were shifted away from the opening in the deck, through which material or tools might fall. The remainder of the time the work progressed unaffected, under the protection of a watchman at the track level, who warned passengers or employees away from the immediate working area and kept the track level swept clear of any small cuttings which fell from above.

Roll Roof Covering

The new rafters, which are continuous between and lapped at the purlins, were each secured to the purlins by means of ⅝-in. hook bolts, and the sheathing boards, laid with full bearing for all end butt joints, were fastened to the rafters by means of barbed car nails, 3½ in. long, with an oval head and a drawn point. The new roof covering employed was 90-lb., blue-black, Slatekote roll roofing, laid lengthwise of the deck with 2-in. lapped seams, and

held in place by means of 1¼-in. galvanized roofing nails spaced two inches center to center.

Frame Monitor

The new monitor is entirely of frame construction, and is built with 3-in. by 6-in. studs, 2-in. by 8-in. cross braces, 2-in. by 6-in. horizontal ties at the eave level, 3-in. by 6-in. rafters on 4 ft. centers, and 2-in. by 8-in. roof sheathing. The new louvres forming the side faces are made up in sections, each 7 ft. 7 in. long by 5 ft. 5½ in. high. The vents in each section are formed by 2-in. by 10-in. boards framed into the side frames at an angle of about 45 deg. with the horizontal, at a spacing of approximately 8 in.

Like the roof proper, the new monitor was constructed progressively from one end to the other, a panel or two at a time, as the old monitor was dismantled. All of the material released from the old deck, both steel and lumber, was carried down to the outer edge of the shed roof, away from the station building, where it could be lowered directly into open-top cars for disposal, without any interference with the passenger areas.

The work of renewing the train shed deck was done under contract, at a cost of approximately $15,300. The details of the work and plans for its conduct were prepared under the direction of W. H. Penfield, chief engineer of the Milwaukee, and G. Tornes, superintendent of bridges and buildings. The work in the field was under the immediate supervision of F. E. Smoot, chief carpenter of the road at Milwaukee.

Ditcher Strikes Passenger Train

AN unusual accident occurred on May 25, at Newington, Conn., on the New York, New Haven & Hartford, in which a passenger train was struck by a ditcher loaded on a flat car standing on an adjacent main track, killing 1 employee and injuring 45 passengers and 6 employees. About 620 ft. east of the station there is a trailing switch for eastbound movements, which leads to two house tracks.

According to the report of the Bureau of Safety of the Interstate Commerce Commission, from which this information is abstracted, the trains involved were a work train, headed east, and westbound passenger train No. 169, known as the Washingtonian. The work train consisted of locomotive 466, a caboose, 1 dump car, 1 gondola, 1 flat car carrying the ditcher, 1 gondola, 1 dump car, 3 work coaches, and 1 spreader, in the order named. When the train reached Newington at 5:20 a.m., the rear cars were left standing on the eastbound main track while the gondola behind the flat car was being set out on one of the house tracks.

The locomotive with the remaining cars then returned to the main track and stopped with the ditcher, which had then become the rear car in the cut, about 30 ft. east of the switch, and was waiting for No. 169 to pass on the westbound track when it was noticed that the boom of the ditcher began to swing from side to side. As the locomotive of No. 169 passed, the boom swung far enough toward the westbound track for the bucket to strike the side of the locomotive. The boom then swung in the opposite direction far enough for the rear end of the ditcher to strike the cars as they passed.

Train No. 169 consisted of 1 baggage car, 1 mail car, 1 baggage car, 2 coaches and 4 sleeping cars, all of all-steel construction, and was running at a speed of 50 to 60 miles an hour at the point of accident. The bucket of the ditcher ripped off the running board of the passenger locomotive at the midpoint of the boiler, and some of the appurtenances, including the top cylinder of the water pump. As the ditcher swung back, its rear corner dented the rear end of the second car and it continued to circle until it turned to reverse position, damaging the third to eighth cars, inclusive, during the circling movement. The fourth car was dented at the window frames to a depth of 12 to 18 in. for its entire length and all windows were broken. The other cars were dented and scraped at intervals. The rear end of the ditcher was badly damaged, the casting on the right side and right rear corner was broken, permitting the rails, 4 to 6 ft. long, which were used to counterweigh the machine, to fly out and be thrown in various directions, some of which went through the windows into the cars.

The ditcher was mounted on 100-lb. rails, 30 ft. long, secured to the deck of the flat car. To prevent forward or backward movement, it was chained to a lug on each side of the car and, as an additional precaution, chocks were placed against the front wheel on one side and the rear wheel on the opposite side. The boom, 26 ft. long was anchored by a cable on each side at the end of the car.

During train movements the clamshell bucket usually rests in an open-top car next to the flat car carrying the ditcher. The machine is powered with a Diesel engine and its operation is controlled by four levers, in addition to certain foot pedals that control the bucket and act as brakes. A brake wheel is also located behind the mast, which when applied prevents the boom from swinging.

According to the report, when the gondola was set out the assistant operator of the ditcher unhooked the cables holding the boom to the flat car and raised it enough to allow the bucket to clear the gondola. According to his statement, he stood on the pedals controlling the opening and closing of the bucket and the holding of the load during the entire switching movement. After the train returned to the main track he lost his balance and fell against the lever that controlled the rotation of the machine and was unable to regain control before the bucket had struck No. 169.

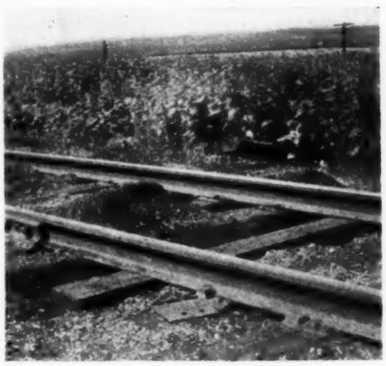
In its discussion, the Bureau said that the evidence indicated that the operator in charge of the machine remained in the caboose from the arrival of the work train at Newington until after the accident, and that the assistant was not a qualified operator, pointing to the fact that he stood on the pedals as indicating his lack of familiarity with the handling of the ditcher. It also stated that if the hand brake holding the machine in neutral position had been applied the accident would not have happened.

Continuing the discussion it was stated that the evidence disclosed lax practices on the part of the employees assigned to the ditcher, and that it is the duty of supervisory officers to define the exact duties of the operator and assistant operator to the end that they will perform their duties in a systematic manner. It was also stated that if the operator and assistant operator had been instructed properly with respect to the extent of their duties, the operator probably would have been at his post before the ditcher was operated in any manner and that this accident doubtless would have been averted. It was recommended that immediate steps be taken to instruct thoroughly employees that are assigned to ditching machines.

Tie-Bed Shaper Speeds Tie Renewals

FOR two seasons a power tie-bed shaper has been in use on the Union Pacific, which is said not only to preserve the original tie bed, but to make unnecessary the tamping of new ties inserted for replacement. In use, the old tie is removed in the ordinary manner, the thickness of the new tie is measure and the machine is set for the required depth. It is then worked over the old bed, reducing it to a precise fit for the incoming tie.

The machine is carried on a light track car, and consists essentially of a ballast-cutter head and an eight horse-



Note the Tight Fit of the New Tie Beneath the Rail on the Shaped Bed

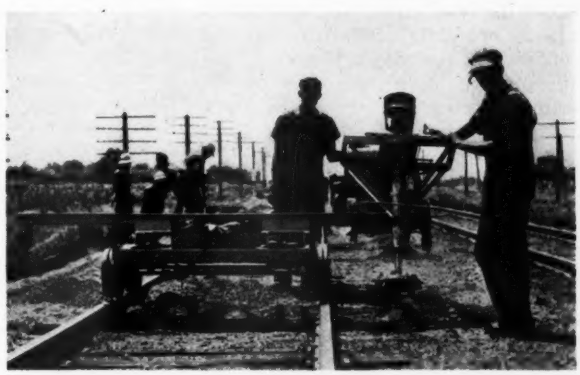
power gasoline engine, mounted on a rigid frame which in turn is seated on rollers that run freely on two light, horizontal transverse beams that provide a track for horizontal movement of the assembly over the full length of the tie. The cutter head is at the bottom of a vertical rotating shaft, which is so placed that in working position it overhangs the front end of the car, while the engine is at the other end of the frame, so placed that it and the shaft are always in balance. The frame itself is hinged to the frame of the car so that it can be tilted backward to raise the cutter head over the rail.

The shaft is rotated at a speed of about 900 r.p.m. by means of a belt drive over a 12-in. pulley at the top of the shaft. The cutter head is 14-in. in diameter and is provided with four tool-steel teeth at the bottom and two on the sides.

As the machine is used, the tie is removed, preferably without cleaning the ballast from the adjacent crib. As soon as the old tie is out, the machine, having been set to correspond to the measured thickness of the new tie, with allowance for the tie plate, is moved directly over the tie bed, and started outside of the rail, reducing the tie bed to the correct elevation to support the new tie. After the bed has been prepared outside the rail, the cutter head is raised over the rail and the same operation is performed between the rails and then outside the opposite rail.

It is then possible to install the new tie, place the tie plate by raising the rails slightly, spike the tie and dress the ballast. It is said that it is unnecessary to tamp the new tie, that it will carry its full load under the first train and that the surface of the track is in no wise disturbed, since the tie rests uniformly and solidly on the old bed, which has not been disturbed but merely planed to the proper depth to receive the tie. It is also said that the bed can be prepared precisely in this manner for any depth of tie, without disturbing an appreciable amount of ballast in the crib; that the old bed is planed to the desired depth without disturbing the solidified ballast beneath; and that there is no settlement under the new tie.

In using this machine on the Union Pacific, no slow orders are issued, trains being allowed to pass freely at full speed. The bed shaper is light and compact and can easily be removed from the track in 30 sec. by four men to clear trains.



The Tie-Bed Shaper Outside of the Rail, in Position to Be Lowered Into the Trench From Which an Old Tie Has Been Removed

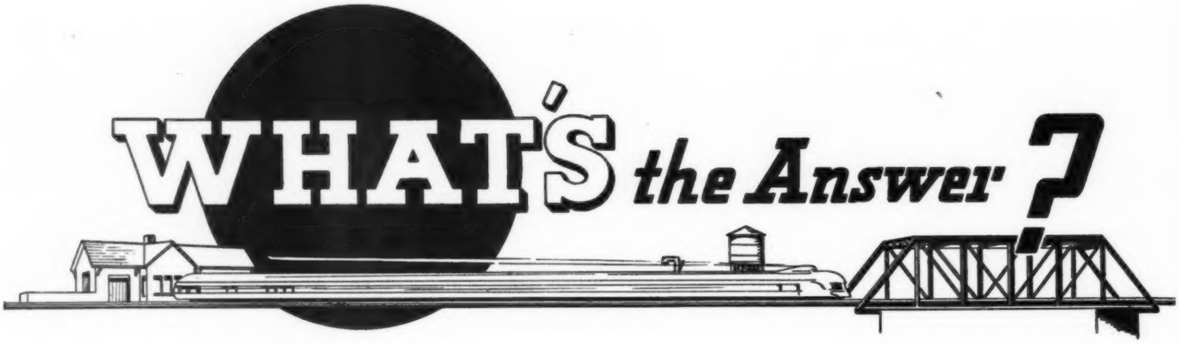
As an indication of the rapidity with which work can be accomplished, during a recent check of one of the tie-bed shapers in regular service, the machine prepared 68 tie beds and 68 ties were installed, spiked and plated and the ballast dressed in 60 min., during which time there were delays aggregating 12 min. to allow trains to pass and to adjust certain teeth in the cutter head. It is found that through the elimination of the necessity for cleaning the cribs and tamping the ties after insertion, the output of the gang is stepped up about one-third.

An experimental machine was tried out on the Union Pacific in 1937. So satisfactory was its performance that

Lifting the Cutter Head Over the Rail

five were used in regular service throughout the season of 1938, and 10 more were built for use this year. In 1938, one gang of 28 men, working 101 days, from June 7 to October 4, inclusive, inserted 46,380 ties, an average of 459 ties per day, or 16½ ties per man. The overall cost was $10,622.33, or $0.229 per tie, including all work from the removal of the tie to dressing ballast. This work covered all tie renewals on 96½ miles of double track line, and included the complete renewal of all ties through road crossings, along station platforms and at motor-car setoffs.

The tie-bed shaper was developed by L. J. Overman, general roadmaster, Union Pacific, and John Foreman, district roadmaster. The machines in service were built in the company's shop at Evanston, Wyo.



Overhauling Track Yearly

What are the advantages and disadvantages of giving a portion of the track on each section a thorough overhauling every year?

Disadvantages Outweigh

By J. R. Derrick
Assistant to General Manager, Norfolk & Western, Roanoke, Va.

As I understand the question, it is intended to bring out the relative advantages and disadvantages of giving a portion of the track on each section a thorough overhauling every year with augmented section forces, compared with a larger operation, say, on a superintendent's division, with specially organized extra gangs having sufficient men and equipment to carry on all phases of the work, including ballast cleaning, tie renewals and tie tamping. On this basis, I can see only one possible advantage in doing a certain amount of work on each section each year—it would be done under the supervision of the foreman who is primarily responsible for the condition of the track. However, this advantage is more than offset by the better organized and equipped extra gang assigned to the larger operation or division project.

On the other hand, there are several disadvantages in the section operation, among which are that the regular section forces are now so small that it is impracticable to attempt an extensive program without doubling up or augmenting the gangs. Doubling or combining section forces is expensive because of the time lost in transporting the men to and from work. If the section forces are augmented, it means that inexperienced men must be employed. Again, while working on neighboring sections, the forces must neglect their own sections.

If the work is done on a section plan, the roadmaster or supervisor will have several projects to look after at one time, and will, therefore, be unable to give each one as much attention as he can give to one large force. Furthermore, multiplying the number of points at which work of this nature is being done also multiplies the interruptions and delays to traffic.

Differences in Opinion

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

This is a subject upon which no two maintenance men agree entirely, and some of their ideas are widely at variance. In part, the reason for this is the wide difference in physical conditions on the railways as a whole, and in part, the equally wide variations in traffic. There are no disadvantages in overhauling, including a general surfacing, track at approximately regular intervals, and I am a firm believer that there is a distinct advantage in doing this on a part of each section every year. I am convinced that not only will the riding condition of the track as a whole be improved by such a plan, but that basically the track will be better, while the section foreman will feel encouraged to keep all of his track up to a higher standard.

At the same time I am not blind to the fact that this is a day of mechanization in maintenance and that the hand methods that must of necessity be employed on the section cannot compete with those of a mechanized gang in either effectiveness or economy. There are many things to be said in favor of letting each section handle its own work and of overhauling a part of each section every year and, if any way can be worked out to do this as economically as the same amount of work can be done by specialized gangs, I am for it. Under present conditions, however, this is not possible and, for the present at

Send your answers to any of the questions to the What's the Answer editor. He will welcome also any questions you wish to have discussed.

To Be Answered in October

1. *What practical measures can be taken to prevent the overloading of motor cars?*
2. *What are the advantages and disadvantages of wire glass? Where should it be used?*
3. *How far should a section gang be allowed to truck dirt from a cut when cleaning and shaping ditches for winter? Beyond this limit, how should the excavated material be disposed of?*
4. *Is it desirable to skin piles for use in foundations? In trestles? Why?*
5. *Should ties that are to come out next year be marked at the time of the annual fall tie inspection? How should this be done? By whom?*
6. *Under what conditions is the growth of vegetation in reservoirs objectionable? What can be done to prevent it?*
7. *What is the best time to cut brush with the view to preventing or retarding further growth? Why?*
8. *How should an old hard-finished plaster surface be prepared for tinting?*

least, we must continue the larger operations of track maintenance with fully mechanized specialized gangs.

Decreases Unit Costs

By A. E. Perlman
Engineer Maintenance of Way, Denver & Rio Grande Western, Denver, Colo.

Primarily the advantages of such a plan are the decreased unit costs that result. The general use of treated ties has greatly reduced the number of tie renewals per mile, so that the concentration of renewals on a portion of the section each year should reduce the unit cost, and only a portion of the roadbed will be disturbed in any one year. Unit costs may also be reduced by the fact that thorough overhauling permits correction of drainage defects and other major items that are passed over in the ordinary routine of spot surfacing and spot tie renewals as carried on by the section forces. The disadvantages will be negligible if good judgment is used in providing the minimum amount of maintenance on those portions of the section that are not being overhauled. In concentrating on a major job of this character, power machines and tools, such as bolt tighteners, tie tampers and other suitable equipment, can be used to reduce unit costs.

Surfacing Pays

By Jack Ausland
Wichita Falls, Texas

On branch lines of light traffic, say one or two trains each way a day, the plan suggested by the question will be of no advantage, and I would allow the section forces to do as much surfacing as they are able in connection with their routine work and let it go at that. As the number of trains and the speed of operation increase the plan offers decided advantages.

A thorough overhauling of the track implies a general surfacing, for track that is not raised from its bed from time to time rides dead and by reason of its lack of resiliency causes more or less damage to the equipment passing over it, depending on the speed. I estimate that a minimum of four trains each way a day calls for surfacing the track at regular intervals. As the number of trains increases these intervals will be shortened. Segregating the surfacing from all other work, including tie renewals, gaging, etc., which it is assumed will be necessary in any event, I estimate that the track can be surfaced once every three years, including the cost of the ballast, for $0.04 per train mile.

While no data are available to confirm this, there can be no doubt that the damage resulting from track conditions alone, to a freight train running at high speed over track that has not been surfaced in, say 10 years, will be at least $0.04 more per train mile than if the track had been raised regularly every three years. It should not be overlooked that the track does not have to be particularly rough to cause this damage; it needs only to have lost its resiliency.

Especially in these times of reduced revenues, the tendency is to restrict those expenditures that clearly represent out-of-pocket costs that can be deferred. On the other hand, the cost of repairing damage to equipment is nonetheless an out-of-pocket cost, despite the fact that the causes that created the need for the repairs remain obscure. So far, nothing has been said about the extra wear and tear on track that has been allowed to run too long without being overhauled. While this item defies calculation, every trackman knows that it is not an inconsiderable one.

Preparatory to Painting

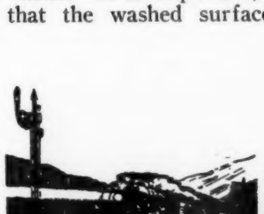
What preliminary work should be done before painting a building? Why? By whom should it be done?

Inspection Will Tell

By E. E. Forbes
Assistant Supervisor Bridges and Buildings, New York Central, Albany, N.Y.

Only an inspection will disclose all of the details of the preliminary work that must be done in preparation for painting a building. In discussing this subject, it is assumed that the building is not in need of general repairs but only such minor work as is ordinarily necessary before painting. In general, all exposed wood and metal work should be put in first class shape before the painting is started. That is, windows should be glazed; cracked and missing putty should be replaced; sash and doors and their frames should be repaired; gutters and downspouts should be gone over; loose weatherboards should be nailed tight; and baseboards should be repaired if necessary.

Old paint should be cleaned from all wood and metal surfaces, and rust and scale from the metal. This can be done to best advantage by means of burning torches, scrapers and wire brushes. On the interior, loose or soft plaster should be removed and the defective areas replastered. The surfaces to be painted should be washed with an approved soap and warm water. It is important, however, that the washed surfaces be rinsed with warm water, using a clean sponge, and allowed to dry before the paint is applied. On both exterior and interior surfaces, all nail holes, cracks and crevices should be filled with putty, or, if they are in the plaster, with plaster or plaster of Paris.



For interior work, the ceiling should be finished before starting on the walls. If the floor is to be painted, the walls should be finished before starting on the floor. When painting ceilings in large rooms, consideration should be given to the use of a painter's traveling bridge. The design that we have used consists of a wood-truss bridge, supported at either end on a bent. This bent is equipped with flanged wheels that run on 100-lb. rails that in turn are supported on 10-in. by 12-in. timbers. The bridge can be easily wheeled from one end of the room to the other, and does not interfere with the use of the room while the painting is going on.

Obviously some of this work, such as filling cracks, etc., is done primarily for appearance. Most of the remainder is done, however, for the purpose of insuring adherence of the paint and a reasonably long life in the service for which it is intended. Another reason is that if the surfaces have not been properly cleaned, the paint may not remain uniform in color, eventually changing color to some extent or developing faded areas.

The force that should do the preliminary work will depend in large measure on the character of the work to be done. In other words, repairs to frame structures and interior woodwork should be done by the carpenter forces; repairs to gutters and downspouts are usually made by the tinsmith or sheet-metal forces; the ma-

sons attend to the plaster; and the painters do the glazing and clean the surfaces preparatory to painting.

Make All Repairs

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

For several years our painting programs have been extensive, designed to catch up with deferred painting. Since many of our buildings had been neglected owing to limited appropriations, we are now making every effort not only to improve the appearance of the structures, but to insure that the paint we apply will give the maximum service. To this end it is our practice to make a thorough and detailed inspection of the structure, making all necessary repairs before any paint is applied. We give special attention to removing all decayed members, as well as tightening any parts that are loose. A careful examination is made of gutters, downspouts and other piping, with the view of eliminating leaks. The roof is examined carefully and all leaks and defects, particularly those in the flashing, are repaired. Ordinarily, doors, windows, door and window frames and baseboards are the points where most of this work must be done, unless the building is in such condition that it is in need of a general overhauling.

Our experience has been that, if paint is applied over decayed or partly decayed wood or timber in which termites have been working, it will peel off or, at best, will change color. The same thing may happen if gutters or downspouts are leaking. In this event the least that may be expected is that the paint will be stained.

It is sometimes necessary to erect scaffolds for the use of the painters, especially if the building is two stories or more in height. We use the paint spray where practicable and have found that if extension handles from four to eight feet long are provided, much of the work from the ladder or scaffold can be eliminated, thus reducing the labor of application by as much as 50 per cent for the areas that can be reached in this manner, besides reducing the hazard inherent in working from a ladder or scaffold.

It should be kept in mind that when paint is to be applied to a surface that has been painted, it is necessary to remove all loose or cracked paint or paint that has failed for other reasons. This can best be done by means of a low pressure torch and a scraper. Then prior to painting with paint spraying equipment, all windows, including glass in doors, should be masked to insure that none of the spray gets onto the glass.

It is our custom, when this is practicable, to paint buildings by groups, that is, all of those at a given point, making all necessary repairs, and clean all of the surfaces to be painted before the actual work of applying the paint is started. The paint is then applied with two or three spray guns, according to the size of the job. Where it is practicable to do so, we make these gangs self-contained; that is, they are so organized that they are able to make all ordinary repairs as well as to do the painting.

Bottoms for Tie Plates

What are the relative advantages of flat-bottom, corrugated and ribbed tie plates? The disadvantages?

Perform Three Functions

By L. L. Adams
Engineer Maintenance of Way, Louisville & Nashville, Louisville, Ky.

All tie plates are required to perform three functions, namely, (1) to protect the ties, (2) to hold gage and (3) to provide an even bearing for the base of the rail. With respect to the first function, any deformity of the bottom of the plate will tend to damage the fibres of the tie and, by considering only this function of the tie plate, it is evident that the flat-bottom plate will provide the best protection.

To protect the tie properly, the tie plate should be an integral part of the tie; that is, there should be no relative movement between the tie and the plate, and either the corrugated or ribbed bottom, when the plate is fully seated, will adhere to the tie better than the flat bottom. For this reason, where flat-bottom plates are installed, some means should be adopted, such as hold-down spikes, to fasten the plate to the tie independently of the spikes holding the rail.

Corrugated and ribbed plates, if there are sufficient ribs, will be equally effective in holding the gage. A plate with a properly designed bottom will, when seated, exert as much resistance to the spreading of the track as two additional spikes. It requires some time for these plates to become fully seated, however, and quite often the top fibres of the ties are damaged before the seating is completed. The depressions made in the tie by either the corrugations or the ribs will hold water and tend to soften the top surface of the tie, thus permitting the plate to cut into the wood.

Where the gage becomes open, from either rail wear or movement of the plate on the tie, and the track is regaged only a slight amount, the ribbed plates will often slip back into their original seats, instead of reseating themselves at their new locations. With corrugated plates, this can be overcome by moving tie plates slightly across the face of the tie. There is no tendency for the flat-bottom plate to return to its original position when regaging is necessary.

Plates with corrugated or ribbed bottoms do not always seat uniformly at first, thereby causing the bearing of the rail to become deformed, creating uneven wear on the head of the rail. I do not consider this to be serious as they will usually seat properly in a short time, so that the plate will eventually have a uniform bearing. This condition does not occur with flat-bottom plates.

Where plates of relatively small size are used without independent hold-down fastenings, either corrugated or ribbed bottom plates should be employed, and when it becomes necessary to regage the track a small amount, the corrugated plate will be more satisfactory than the ribbed plate. When plates of large size, with independent hold-down fastenings are employed, the flat-bottom plate should prove satisfactory in holding the gage, and it will damage the fibre of the ties less than either of the other designs.

Opinions Vary Widely

By W. L. Roller
Division Engineer, Chesapeake & Ohio, Columbus, Ohio

There is reasonable unanimity regarding the essential details of the design of the top of the tie plate, but when the bottom is considered, opinions vary widely with respect to the requisites of design. Probably the best approach to the relative advantages of the plain, corrugated and ribbed designs is to consider how well they perform the functions for which they have been designed and to determine whether, in performing these functions, disadvantages arise that minimize or completely offset the advantages of each type of design.

The flat-bottom plate affords a complete and full distribution of the load to the tie, compressing and not breaking the wood fibres. No unusual or uneven strains or stresses are developed within the plate itself if the tie has been adzed to provide a level seat. Plain-bottom plates make gaging and regaging easier. Regaging is rendered difficult if depressions or notches are cut or pressed into the tie by ribs or corrugations.

Some objections have been raised to the use of flat-bottom plates on the ground that they lack means of holding the gage. This may be, under some conditions, a logical objection and a decided disadvantage in cases where it is not feasible to provide other means of holding the plates in position, or where the destruction of the wood fibre under the plate is a matter of minor consideration. On the heavier tonnage tracks of today, other and more adequate means are provided for the maintenance of gage, other than the projections on the bottom of the plates, which depend largely upon the displacement of the wood fibre of the tie for their effectiveness.

Lag screws and hold-down spikes of various designs are employed to keep the plate in position, both horizontally and vertically. Accurate preboring of the spike holes also adds greatly to the ease of maintenance of gage. With canted tie plates, the gage tends to tighten under traffic until the plates have been fully seated. One decided advantage of plain-bottom plates is that the seating action is neither so pronounced nor so prolonged. Very little tightening of the gage occurs with plain-bottom plates, provided the spike holes are prebored accurately, and the hold-down fastenings can be applied almost immediately.

Among the advantages claimed for the corrugated-bottom plates is the obvious one that they do assist in holding the gage after the indentations have been made in the surface of the tie. Where it is not feasible to provide other means for holding the gage, this may be a decided advantage. The corrugation is preferable to the sharp rib, for it merely compresses, although it distorts, the wood fibre, without cutting or breaking it. Again, the corrugations usually add some strength to the plate in comparison with its weight, for they have a stiffening effect.

The ribbed-bottom plate is one of the oldest designs, and is often retained in service more as the continuation of a custom rather than because of its effectiveness or utility. Doubtless, in an earlier day, it performed a mission, but at what a cost in tie life. In the older designs the ribs were high and sharp, and literally cut the tie in two, allowing the entire tie plate to imbed itself in the tie, thus forming a water pocket. The situation was aggravated by the fact that the early designs were small in area. The tendency throughout the years among those who still cling to the ribbed bottom has been to make the ribs shallower and more blunt, consequently less objectionable.

I believe that the whole trend of thought, ripened by growing experience, has been away from rather than toward cleats and barnacles on the bottom of the tie plate, which serve largely to shorten the life of ties.

Inspecting Steel Spans

How frequently should steel spans be inspected? What details should be examined?

Every Six Months

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Safety underlies all bridge inspections. Steel spans should be inspected often enough to insure discovery of defects before they endanger the structure or reduce its load-carrying capacity. Under unusual conditions a bridge may require daily or weekly inspection, but this is a special and not a normal requirement. The regular section forces should be trained to observe unusual conditions or damage by fire, flood, derailments or other causes, or displacement of the structure in whole or in part, as may be evidenced by the line or surface.

It is a wise precaution to have a competent bridge inspector go over all old steel or iron spans, say those built up to 1896, or spans carrying more than the designed load, at least once every three months. The substructures should also be examined carefully and all conditions noted. His report should show whether defects are progressing, so that steps for more frequent observation or repairs may be taken. These reports should be comprehensive enough to avoid duplication of inspections, so far as possible. On heavy duty lines having more modern bridges, an inspection every six months should be sufficient, and when the bridges are of recent construction once a year may serve all practical requirements.

A regular inspection of steel spans should include bearings, anchor bolts, bed plates and rollers. Particular attention should be given to the line and surface of the track and the action of the spans under passing trains. Excessive deflection, swaying, twisting or settling of parts are evidence that something is wrong. Tension members should not be slack, and compression members should remain straight, free from bulges, twists or bends and bear properly. Floor systems should be inspected most thoroughly, and hangers supporting floor beams given special attention. Nuts on the ends of hangers should be tight and plate hangers should have tight rivets, with no signs of cracking or shearing. All connections should be inspected, but particularly those between floor beams and trusses.

In general, the inspection of steel spans should be frequent enough to detect unusual conditions, any weakness or any progressive defects. It should be thorough enough to permit those responsible for the maintenance of the structures to plan and execute needed work before any question as to the safety of the span arises.

Three Times a Year

By John L. Vogel
Bridge Engineer, Delaware, Lackawanna & Western, Hoboken, N.J.

Steel bridges that are to be maintained in fair condition should be inspected at least three times a year, depending on the rated capacity of the bridge and the volume of traffic passing over it. There are cases where bridges should be inspected more often, however, especially when the point has been reached where the structure is to be renewed, strengthened or repaired, or where it has been necessary to place restrictions upon it. No set rule can be laid down for determining the interval between inspections in any of these cases.

One could answer the inquiry as to the details to be examined at great length, but without going into too much detail, the inspector should watch closely the action under load; he should examine all sub-structures critically, including foundations, bridge seats, and the condition of the masonry. He should go over all details of trusses and girders, examining every member, giving special attention

to bed plates, rollers, pins, rivets, connections, etc., and should notice the alinement. The floor system should be given the same detailed inspection, including examination of floor beams, stringers, connections, ties, guard rails, and bearings. The top and bottom laterals should be examined, including the portals. Vibration and deflection should be noted and, if of the moveable type, the lifting or turning machinery should be gone over.

Advantages of Welded Pipe

To what extent is it practicable to use welded pipe for hot and cold water and steam lines? What are the advantages? The disadvantages?

No Disadvantages

By W. L. Curtiss
Mechanical Engineer, New York Central, New York

For several years we have been installing a considerable amount of welded pipe, particularly in enginehouses, for conducting hot water in connection with boiler-washout systems, also for the cold-water lines and to some extent for steam lines. To a less extent, we have installed welded pipe for air lines. We find that the use of welded pipe reduces the first cost of installation materially and from our limited experience we believe that it also reduces the maintenance cost on the hot water and steam lines in the same degree. It is our intention to extend the use of welded pipe, and so far we have discovered no disadvantages in its use.

Depends on Size

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

The extent to which it is practicable to use welded pipe in any application depends on the size of the pipe. We do not consider it economical to weld pipe that is 1 in. or less in diameter, and do not do so. We do find that welded pipes in the larger sizes give greater satisfaction, in both service and economy, together with less maintenance, than coupled pipe.

We have noted for 10 years that where welded pipe is in service in overhead lines in enginehouses and shops, maintenance costs have been reduced from 30 to 40 per cent, compared with coupled, ell and other threaded connections. This is particularly true where there is vibration from machinery or from exhausts in air and steam lines. Pipes frequently broke off when coupled by means of threaded connections and in many instances caused personal injuries, as well as delays in operation of various units. For these reasons we are in favor of welding pipes for all purposes, except the smaller sizes that have been mentioned.

Reduced Maintenance

By Water Service Inspector

About 25 years ago I was a water-service repairman at a terminal where there were important shop, engine-terminal and coach-handling facilities. This plant contained an elaborate system of piping for water, steam and air, in addition to the underground water lines. There were about 2,500 screwed joints in addition to those necessary for inserting fittings. The high-pressure steam mains were equipped with flanged joints, with the flanges screwed to the pipes, but the distribution lines had ordinary screwed couplings and other threaded fittings.

Most of the piping was old, but it had been patched here and there with new pipe, and leaks were common, particularly in the steam and air lines, so that it required the full time of about three men to keep the system in usable condition, and we were often called out at night to make repairs. A new heating system was authorized which required approximately 15,000 ft. of feeder and vacuum return lines. It was decided to replace the existing heating lines and to install the new vacuum lines with welded pipe. This proved to be so satisfactory that shortly thereafter we replaced all of the existing overhead steam, air and hot and cold-water lines with welded pipe. This latter work was done progressively, but the results were immediately apparent, for the maintenance demands fell quickly to only a small fraction of what they had been, and emergency repairs were eliminated.

The foregoing has been recounted in some detail, for it is as good an example as I know of to show the contrast between welded and screwed pipe. It is true that the former piping was old, but all pipe lines grow old in the course of time and joints fail usually before the body of the pipe does, but in welded pipe there are no joints to give this trouble. No one who is familiar with welded pipe and the service to be obtained from it will question its practicability. To recount all of its advantages would require too much space, while the disadvantages are almost non-existent.

Reducing Tie Damage

What practical methods can be employed when laying rail to reduce the destruction of ties?

Protect with Creosote

By C. D. Turley
Chief Tie Inspector, Illinois Central, Chicago

There are several important operations that must be performed in correct sequence, and properly conditioned tools must be employed, if tie life is to be conserved by reducing damage to the tie during the laying of rail. After the old rail and tie plates have been removed, creosoted tie plugs should be driven into all spike holes to prevent the entrance of moisture to untreated wood and thus set the stage for decay, as well as to increase the holding power of the redriven spikes. Metal-disc tampers, 4 to 6 in. in diameter, weighing 10 to 15 lb., have proved to be more effective than any other tool for driving tie plugs, since less plugs are broken and they are sure to be driven home. Plugs should be driven to the full depth of the spike holes if the maximum tie conservation is to be obtained by eliminating decay around the spikes.

Power adzing machines should be used in preference to hand adzing, and the amount of wood cut away should be held to the minimum consistent with the proper seating of the tie plates. The adzing knives should be sharp to insure a smooth surface and to avoid the tearing away of excess material. The judgment of the operator with respect to handling the machines, changing knives, etc., has

much to do with the manner in which tie life will be conserved.

As soon as the adzing is completed, the cut surface should be covered with creosote, preferably hot, making sure that no untreated wood is left exposed. The best results are obtained when the creosote is poured directly upon the adzed surface from an ordinary sprinkling can, with the end of the spout flattened to prevent splattering. A hair brush should then be used to spread the creosote evenly, brushing lengthwise of the tie. The brush is superior to a mop, since the free creosote will run into any cracks there may be in the surface and the oil is better distributed.

After the rail has been laid, the track should be skeletonized, the old ties spaced and the necessary new ties installed. This reduces damage from spiking to the minimum and avoids the second respiking of the ties, while the new ties are spiked only once. If the base of the new rail is wider than that of the old, the new ties will have one instead of two sets of spike holes. Power spike drivers should be used in preference to hand spiking, since a more uniform and more satisfactory job can be obtained. Special care should be exercised to insure that the track is gaged correctly and that all spikes are set close to the rail base and driven straight. If this is done much respiking and regaging, with the usual results in damage to the wood fibre, will be avoided.

Machine Adzing

By C. S. Kirkpatrick
Chief Engineer, Missouri Pacific Lines, Houston, Tex.

Adzing the ties with power adzing machines and plugging the spike holes is the full answer to this question. Hand adzing is destructive to ties and results in an inferior job of laying rail, compared with machine adzing. Tie adzing machines such as are now available conserve the life of ties and no rail gang should be without them.

Oiling Rail Joints

What are the advantages, if any, of oiling rail joints periodically? How should this be done? How frequently?

Uses Oil Sludge

By Paul G. McGuire
Section Foreman, Atchison, Topeka & Santa Fe, Strohm, Okla.

To avoid battered rail ends it is imperative that the bolts be kept tight to hold the joints snugly against the fishing surfaces and, since the wear on these surfaces is continuous, it is necessary to tighten the bolts at relatively close intervals. Sometimes the wear on the fishing surfaces progresses to the point where there is no remaining draw, the angle bars being jammed against the web of the rail, with the rail ends free to pound up and down under traffic. If the bolts are tightened as often as they should be, there is little necessity for oiling them, so far as wear is concerned, but the tightening of bolts is so often neglected that it is better to oil the joints and retard the wear. Besides this, the oil will protect the metal from corrosion and reduce the number of frozen nuts.

Oil should be applied when the rail is laid and renewed as often as it weathers off the joint. A small amount should always be applied to the threads exposed when the bolts are tightened. The first application should include the joints, the rail and the bolts. Subsequent application can be made with oil sludge by hand brushing at a cost of less than $4 a mile for labor. This oil refuse costs very little, adheres well to the metal and will last a year in this climate. My experience indicates that the advantages of oiling rail joints periodically is not debatable.

Affords Protection

By C. E. Miller
Assistant Engineer of Maintenance, Chicago & North Western, Chicago

There is an advantage in oiling rail joints, as it affords protection against rust and wear and, when applied to the fishing surfaces, assists the joint to take its share of expansion and contraction. By maintaining a film of oil on the contact surfaces, the rate of wear between the bars and the rail is retarded. It is important, however, that the oil used be able to resist corrosion, have good penetrating qualities and be able to adhere to metal surfaces.

When laying new rail, it is our practice to apply oil by hand brushing to that portion of the rail that is within the limits of the joint bars, as it is then that the inner surface of the joints can best be coated with oil. The bolts should also be oiled to protect the threads against corrosion and permit them to be retightened as necessary. The frequency with which the oiling should be done depends upon the kind of oil used and the rate of corrosion from brine drippings and atmospheric conditions. In most of our territory oiling at yearly intervals is sufficient, but in the more arid sections where the track is comparatively free from brine attack, less frequent oiling is required.

In our heavy-traffic territory, where brine drippings are more severe, it is our practice to apply oil to the full length of the rail, including the joints, with an oil-spray car that is handled by a work train, taking steam from the locomotive to operate the oil pumps and to heat the oil to the high temperature at which it is sprayed onto the rail. This full oiling of the rail affords protection against corrosion to the rail, the joint bars, the tie plates, the spikes and the heads and nuts of the bolts, and experience has shown that the method of application is economical and effective.

In some cases we have had joints that were not taking their proper expansion and we have relieved this condition by means of hand sprayers equipped with small perforated pipe that can be inserted back of the joint bar to reach the entire area with oil, thus lubricating the bearing area of the bars against the rail.

Aids Expansion

By William Gadd
Representative, Rail Joint Company, New York

For some years, not a few roads have followed the practice of oiling the rail before applying the joint bars when laying rail. When applied immediately before the bars are placed, the oil provides a semi-protective coating that facilitates the application and seating of the bars and, later, is an aid in maintaining uniform expansion.

In general, the oils that are commonly used for the purpose fail to provide the desired protection for any length of time. For this reason, subsequent oiling of the joint bars is desirable, to prevent corrosion of both the rail ends and the bars. In addition, the freezing of the joints is retarded and, under ordinary conditions, enough oil finds its way along the bolts and into the threads to protect them and facilitate the tightening of the bolts.

It is a characteristic of oil that it flows more freely when warm, so that

if the periodic oiling of the joints is done in the hot summer months the work can be done most economically and with best results. Portable hand-operated pressure sprayers are on the market which are equipped with long nozzles that may be inserted between the bars and the rail to facilitate the oiling of this area. A generous application of the oil behind the bars, and a lighter application outside, should provide sufficient protection, under ordinary conditions, for at least a year. Obviously, under more severe conditions, oiling at half-year intervals may be desirable.

A new product, recently introduced, affords a simple and economical means of lubricating rail joints. It is a plastic material that comes in either bulk or molded form. On rail already in service, the bulk material is applied under pressure behind the joints, filling this space and thus excluding dirt, cinders and other corrosive substances. At the same time, the lubricant it contains finds its way into the contact area around the bolts, offering the needed protection and lubrication.

On new rail the molded form is applied with the joint bars and, as the bolts are tightened, the material is forced into the space between the bars and the rails, filling it completely, likewise excluding foreign substances and lubricating the contact surfaces and bolts. This material retains its plastic and lubricating qualities for 8 to 10 years, making it unnecessary to oil behind the joints during this period.

Many roads now oil the entire rail and all fastenings to protect them against brine corrosion. Where this practice is not followed, and where the plastic material mentioned is used behind the joint bars, an application by brush on the outside of the joints can be made when necessary.

Very Beneficial

By J. G. Paull
Section Foreman, Chicago, North Shore & Milwaukee, Niles Center, Ill.

It is beneficial to oil rail joints for, in addition to the protection thus afforded against corrosion, the lubrication of the fishing surfaces reduces the tendency of the joint to freeze and thus permits the rail to move more freely in expansion and contraction. I have been oiling the joints once a year but I believe that better results can be obtained if this is done twice a year. I find that it is not necessary to line the track as often now as it was before the joints were oiled.

In applying the oil, I take the angle bars off and give them, the rail and the bolts a good dosage, reapplying them immediately. This is done with a mixture of 5 gal. of oil; 4 lb. of grease; and 1 qt. of kerosene. This mixture should be heated and applied with a brush. I find that the grease is helpful in giving the film a much longer life, for if it is not used, the oil evaporates or the rain washes it off in a relatively, short time.

Sanitation Without Sewers

Where water under pressure, but no sewer, is available, what provision can be made for sanitary toilets in stations? What features should be given special attention?

Many Failures

By Building Engineer

Obviously, the simplest answer to this question is to install septic tanks, but there is more to the subject than this. I have seen a great many septic tanks installed at outlying points and some even at relatively larger towns where the stations are located on the outskirts. I have also seen many failures result from improper design of the septic facility. I recall one of these at a large shop and engine terminal where several hundred men were employed. The intention was to drain the effluent from the tank to a neighboring swamp, but because the tank failed to function the swamp became a real nuisance.

In the first place, a septic tank should consist of two chambers of ample capacity, both sealed but interconnected, the connections being placed from 18 in. to 2 ft. below the surface of the water, so that no surface flow will develop. The first chamber receives the discharge from the toilets. The solid matter generally settles to the bottom, while the liquids overflow into the second chamber. As the nitriting bacteria work on the solids, gases are generated and the solid matter eventually rises to the surface where the bacteria complete the process of liquefaction.

In this way no solids are carried over into the second chamber. In this chamber the process of purification is carried to completion and the effluent is discharged as a reasonably clear liquid having practically no solids in suspension, and without objectionable odor. The important things to bear in mind when designing a septic tank are (1) that the capacity of the first chamber must be sufficient to permit the process of liquefaction of the solid matter to progress at a rate that will insure against accumulations that may get over into the second chamber; (2) that the capacity of the second chamber must be enough to allow the purification to be completed before the liquid is discharged; and (3) that the connection between the chambers must allow no surface flow from the first to the second chamber.

Uses Sewer Pipe

By Supervisor of Bridges and Buildings

I have installed several septic tanks at stations of moderate size under the conditions mentioned in the question and, except for some trouble with the first one, that was later corrected, they have been uniformly successful. To avoid excessive cost, I sink two sets of three sections of 24-in., 30-in., or 36-in., sewer pipe to form two wells, according to the capacity needed, so that the tops will have ample cover. These pipes are placed with their bell ends up, the bottom section being embedded in concrete, and all joints are sealed carefully. The top sections have two 4-in. lateral T-connections diametrically opposite, and all four are in line and at the same elevation. A connection is then made between the two wells or chambers by means of 4-in. sewer pipe, this connection containing a trap laid in reverse, that is, with the belly up. Next the tops are sealed and the outlet pipe is laid.

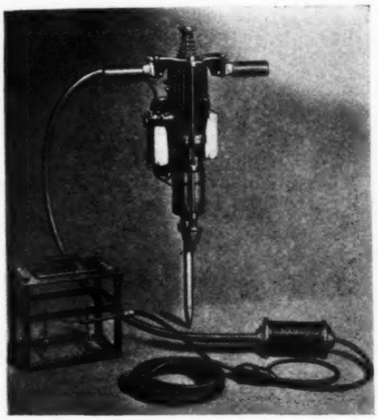
The most important feature of this construction is the turning of the trap upside down. If this is not done the liquid in the first chamber will overflow from the surface and any floating solids will be carried over into the second chamber, completely nullifying the process of purification. This was what happened with our first installation, my division engineer insisting that the traps be laid in the normal position. Equally important, however, both chambers must be sealed, and the outlet from the second chamber should be trapped.

I have found that much better results are obtained if three or four cakes of compressed yeast are dissolved and introduced into the tank when it is first placed in service. This seems to stimulate the action of the liquefying bacteria at the beginning, at a time when they multiply slowly.

PRODUCTS of Manufacturers

Battery and Coil Hookup for Tampers

A NEW battery and coil connection has been developed by the Barco Manufacturing Company, Chicago for use in the operation of Barco gasoline hammers and Tytampers, permitting the operation of several hammers or tampers a considerable distance from one standard 6-volt wet battery. The new connections consist of a spark coil placed in a streamlined, watertight container attached to the hammer by 5 ft. of Barco cable, a short length of two-conductor, rubber-covered, flexible cable connected to the spark coil at one end and at the other end to a 15-ft. length of similar two-conductor cable with quickly detachable battery terminals. These connections provide a total length of 25 ft. of cable from the battery to the hammer. For special applications the 15-ft. length of two-conductor cable may be increased up to 50 ft. in length. The two-conductor cable from the spark coil is connected to the cable from the battery by a heavy-duty, waterproof cable connector. A skeleton type steel battery box with a handle is also provided. The battery box will allow maximum battery dimensions of 12 in. in length, 7⅜ in. in width and 9½ in. in height and will accommodate almost any 110-ampere 6-volt wet battery.



Showing Hammer Equipped with New Battery and Coil Hookup

A number of advantages are claimed for the use of wet batteries for ignition in the operation of the Barco hammers and Tytampers. More economical operation is obtained than with dry batteries for continuous operation over long periods of time. In addition, efficient ignition is insured, regardless of the season of the year and temperature variations. The weight of the battery has been offset by the long connections, which allow flexibility of operation of the tool and the placing of the spark coil in the line near the hammer or tamper insures the necessary quality of spark.

A standard 6-volt wet battery of at least 110 ampere hour rating at the 20-hour rate is recommended and the only care necessary is proper provision for recharging the wet battery before it is run down to a point which might cause collapse of the plates.

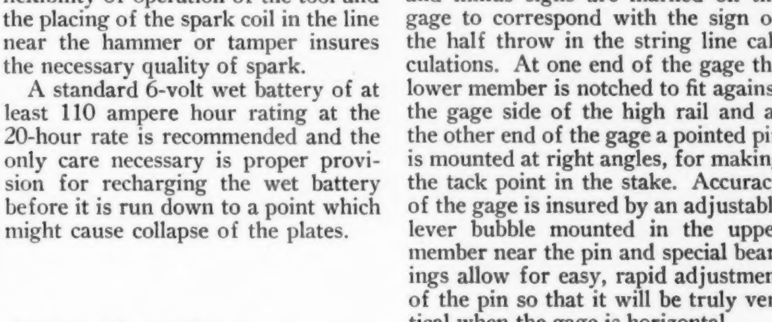
Stringline Gage for Setting Stakes

THE String Lining Equipment Company, Conneaut, Ohio, has perfected a light, sturdy Stringline Gage made of special aluminum alloy tubing for use in setting the stakes and tack points in string lining work, which eliminates one calculation and increases the accuracy and speed of setting stakes and tack points and thus facilitates the field work.

The gage consists of two aluminum members, each the size and shape of a heavy ruler mounted on edge, one on top of the other, so that they slide in relation to each other. A set screw is provided for setting the gage at a fixed length and the upper member is marked on one side with a scale divided into fifths of an inch and on the other side with a scale divided into tenths of an inch. The scales on the upper member are numbered continuously out from a zero point and plus and minus signs are marked on the gage to correspond with the sign of the half throw in the string line calculations. At one end of the gage the lower member is notched to fit against the gage side of the high rail and at the other end of the gage a pointed pin is mounted at right angles, for making the tack point in the stake. Accuracy of the gage is insured by an adjustable lever bubble mounted in the upper member near the pin and special bearings allow for easy, rapid adjustment of the pin so that it will be truly vertical when the gage is horizontal.

This company also furnishes other accessory string line equipment as follows: string line blocks, which offset the string one inch from the rail for use in measuring small mid-ordinates near the ends of curves; string line rulers marked with any desired graduations; string line cord and a canvas case for carrying the complete outfit.

It is said that the gage, in addition to increasing the accuracy with which



Drawing of Stringline Gage in Position for Setting Tack Point on a Stake

the tack points may be set, eliminates a number of calculations, especially if the initial measurements are made with a stringline ruler which is graduated continuously in tenths or twentieths of an inch, (i.e. conversion of inches and fractions thereof into whole numbers representing tenths or twentieths of an inch, conversion of half throws into actual throws and computing the distance for setting the stake). It is also stated that the use of this gage permits stakes to be set much faster and easier.

Portable Bridge and Building Unit

THE Mall Tool Company, Chicago, has developed a 1-hp., "Jack-of-All-Trades" portable gasoline engine unit, which can be carried from place to place easily by one man, and a complete new line of attachments for use

The Jack-of-All-Trades in Action

with this unit, adapting it for many types of bridge and building work, such as pumping, sawing, concrete vibrating and surfacing work, sanding and drilling wood or steel.

The new power unit, which weighs 55 lb., is a 1-hp., air-cooled, gasoline engine with an idling speed of 1,000 r.p.m. and a top speed of 4,000 r.p.m. The engine has a gas control and an air cleaner, an oil capacity of 1-1/3 pints and a gas tank capacity of two quarts. It is mounted on a round, anti-creep swivel base and has a carrying handle and wrench and spindle bracket. The power is transmitted to the attachments by a flexible shaft and housing 12 ft. long. The flexible shaft is 7/16 in. in diameter and the housing is of the continuous internal bearing type.

The attachments developed for use with this machine are smaller and lighter in weight than similar attachments made by this company for its larger multi-purpose bridge and building machine. The concrete vibrator, which weighs 25 lbs., is 14 in. long and 2⅛ in. in diameter and has a ball-bearing-mounted vibrating element and a specially hardened shell and tip. The saw attachment weighs 15 lb. and has a blade 8-1/3 in. in diameter which will cut a maximum depth of 2¾ in. and with which bevel cuts at 45 deg. angles can be made in 2-in. dressed lumber. A drilling attachment is provided with a drill chuck adjustable from zero to ½ in., which has a drilling capacity in wood of 1½ in. and in steel of ¾ in. Other accessories include a concrete surfacing attachment for dry grinding or wet rubbing, sanding and wire brush attachments and a sump pump attachment with a capacity of 1,500 gal. per hr. against a 10-ft. head.

New Aggregate for Floor-Patching Mixes

A NEW aggregate, known as Roxite, which is adaptable especially for use with floor-patching materials, has been placed on the market by the Flexrock Company, Philadelphia, Pa. Roxite is comprised basically of black quartz which is processed by being cleaned of all foreign matter, crushed and dried in kilns and then graded so that the particles form a dense, solid mass. In fact, it is said that when the material is mixed in the proportions of one part of Portland cement, 3 parts Roxite and 4 gal. water, the resulting mixture is so dense that, when it is laid to a depth of 1 in., workmen may walk on the surface of the material immediately to do the troweling.

The new material is recommended especially for use in floor construction and repair, and it is said that it may be used with almost any floor-patching material in place of sand and stone. When it is used in this manner, it is claimed that Roxite increases the coverage approximately 20 per cent and that, because of its hardness and toughness, it adds substantially to the service life of the floor resurfacer. When the material is used for this purpose it is recommended that it be mixed in the proportions of 1 part Portland cement; 1½ parts plastic patching material; 4 parts Roxite; and 1 part water. It is pointed out that in semi-mastic or mastic floor-patching mixtures, the aggregate is responsible largely for the stability of the mass. Since Roxite is so graded as to pack tightly, it is said to have a high load-carrying capacity when used as the aggregate in such mixtures.

Because of its hardness and toughness, Roxite is also recommended for use as an aggregate when high-strength concrete is desired. In this event it is used in place of sand in the suggested proportions of 1 part Portland cement; 2 parts Roxite; and 4 parts of ¾-in. crushed granite, trap rock or other hard material.

New Books

A.R.E.A. Proceedings

PROCEEDINGS of the American Railway Engineering Association for 1939, 803 pages, 6 in. by 9 in. Bound in cloth of half Morocco. Published by the Association, 59 East Van Burean Street, Chicago. Price, cloth $8, half Morocco, $9.

This volume contains the complete record of the year's work of this association, including reports of 27 standing and special committees, which were presented at the fortieth annual convention at Chicago on March 14, 15 and 16, 1939, together with the discussions that followed their presentation. It also includes addresses by the late J. W. King, vice-president, operation and maintenance, Association of American Railroads; by C. E. Smith, vice-president, New York, New Haven & Hartford; and by C. E. Johnston, chairman, Western Association of Railway Executives.

Committee reports covered a wide range of subjects, providing valuable reference material on both railway maintenance and operation. Among the total of 127 subjects considered by the convention were specifications for track scales; air conditioning of buildings; progress in the manufacturing of concrete; destruction by termites and ways of prevention; an extensive discussion of the factors determining the location and type of culvert to be installed; width of roadbed and angle of slopes; the use of asphalt in ballast; tie service records on 8 roads; tie renewal statistics for 1937 on all Class I roads; and tie renewal statistics since 1911 on 27 selected roads; piles for marine construction; fastenings for continuously welded rail; the effect of increased weight of rail on track labor; fissures in rail; and bolt tension in rail joints.

NEWS of the Month!

Railroad Unemployment Insurance Goes Into Effect

Under the provisions of the unemployment insurance act which was passed for railroad employees last year, the Railroad Retirement Board began paying benefits in July. The largest amount that an employee may receive under the law is $240 a year and the benefits are payable for a maximum period of 80 days to workers who qualify and can show that they earned $150 during the previous year.

I. C. C. Authorizes Abandonment of Q.O. & K.C.

On July 24, the Interstate Commerce Commission authorized the abandonment of approximately 140 miles of the Quincy, Omaha & Kansas City (controlled by the Chicago, Burlington & Quincy), between Milan, Mo., and North Kansas City. The remainder of the Q. O. & K. C., 105 miles, between West Quincy, Ill., and Milan will be taken over and operated by the Burlington. The commission stated that it was without authority to impose conditions for the protection of employees who would lose their jobs.

German Train Attains A Speed of 133 M.P.H.

A new three-car, Diesel-propelled train of the German State Railways recently attained and held a top speed of 133 m.p.h. for 25 minutes during a test run in which an average speed of 124 m.p.h. was made for the 186 mile stretch between Berlin and Hamburg, according to an official report of June 26. The roadbed over which the test train made the record was rebuilt for high speed traffic in 1932 and the Flying Hamburger, a pioneer Diesel streamliner, has been operated regularly over it with a schedule calling for an average speed of 81.4 m.p.h. since the spring of 1933.

Illinois Central Publishes "Streamlined" Timetable

On July 25, the Illinois Central published a new "streamlined" folder-size timetable for the information of the traveling public. The new timetable has been drastically remodeled to simplify the information presented. Schedules have been reduced in size, showing only the towns at which trains make regular stops. Other stations are shown in a separate index. The schedules are printed in a different style of type, which appears larger and is easier to read. Other features included are—a brief suggestion on how to read the folder, a comprehensive table of contents and a table of railroad and Pullman fares.

Our Apologies

The interesting and informative A.R.E.A. committee report relative to the organization of forces for and methods of maintaining wood trestles, which was abstracted in the July issue under the head "Stepping Up Efficiency in Timber-Trestle Work" was the work of a subcommittee of the Committee on Economics of Railway Labor, of which H. E. Kirby, assistant engineer, Chesapeake & Ohio, Richmond, Va., was chairman. Inadvertently, in presenting the abstract of the report, no mention was made of the author of the report, as presented before the March, 1939, convention.

New, Fast All-Coach New York-Chicago Service

On July 28, the New York Central and the Pennsylvania each placed in service two new, de luxe all-coach trains providing fast overnight service between Chicago and New York. The New York Central trains, which are named the "Pacemaker," make both the eastbound and westbound runs in 17 hours, while the Pennsylvania trains, known as the "Trail Blazer" have a 17-hr. schedule from New York to Chicago and a 17 hr. and 25 min. schedule eastbound between those cities. Both trains are air-conditioned throughout; provide special dimmed illumination during sleeping hours; carry a lounge car open for use by all the passengers and provide porter service and individual adjustable seats.

Rock Island Completes "Samson of the Cimarron"

The Cimarron River cut-off, a 7.88 mile line change on the Chicago, Rock Island & Pacific, the most outstanding feature of which was the construction of a new 1½ million dollar bridge crossing the Cimarron river 92 ft. above low water level, and which also involved 2½ million cu. yd. of grading, was opened to traffic on July 8. The new bridge consists of five 250-ft. single track deck truss spans supported on two reinforced concrete abutments on steel piling and four streamlined, reinforced concrete piers, extending 150 ft. below the base of rail, resting on foundations of the pneumatic caisson type. The line change reduced the distance 3.57 miles, eliminated eight curves, reducing the curvature 355 deg., and reduced the grade from 0.8 per cent to 0.5 per cent. The change also eliminated the old low level bridge across the Cimarron river which had previously been washed out a number of times by this treacherous stream.

Railroad Employment Up

Employees of Class I railroads of the United States, as of the middle of June, 1939, totaled 991,900, an increase of 8.39 per cent compared with the corresponding month of 1938 and an increase of 3.58 per cent over May, 1939, according to a report of the Bureau of Statistics of the Interstate Commerce Commission. The major proportion of the increase over the previous year was in the group of maintenance of way and structures employees, which increased 16.15 per cent. Increases for other groups were: professional, clerical and general, 1.07 per cent; maintenance of equipment and stores, 14.06 per cent; transportation (other than train, engine and yard), 2.59 per cent; transportation (yardmasters, switch-tenders and hostlers), 2.54 per cent and transportation (train and engine service), 4.80 per cent.

Shippers Expect Increased Loadings for Third Quarter

Freight car loadings for the third quarter of 1939 are expected to be about 9.9 per cent above actual loadings in the same quarter of 1938, according to estimates compiled by the 13 Shippers Advisory Boards. On the basis of these estimates, freight car loadings of the 29 principal commodities will be 5,268,278 cars in the third quarter of 1939, compared with actual loadings of 4,793,346 cars during the corresponding period of 1938. The predictions of the boards for the various regions vary considerably, with the Northwest and Great Lakes boards anticipating 37.4 per cent and 30.0 per cent increases respectively in their regions. And the Trans-Missouri-Kansas and the Central Western boards predicting 3.2 per cent and 1.7 per cent decreases, respectively. Of the 29 commodities included in the estimates, those showing the largest percentages of increases are: Ore and concentrates, 74.6 per cent; automobiles, trucks and parts, 41.1 per cent and iron and steel, 24.1 per cent. Among the decreases estimated are: Hay, straw and alfalfa, 16.1 per cent; grain, 13.4 per cent and potatoes, 5.8 per cent.

Personal Mention

General

Donald A. Logan, assistant division engineer on the Erie at Youngstown, Ohio, has been promoted to inspector of operation, with headquarters at Cleveland, Ohio.

L. E. Thornton, assistant division engineer on the Eastern division of the Alton, with headquarters at Bloomington, Ill., has been promoted to assistant trainmaster, with the same headquarters.

Leon V. Lienhard, district engineer of the Northern district of the Western lines of the Atchison, Topeka & Santa Fe, with headquarters at La Junta, Colo., has been appointed trainmaster at that point.

D. M. Rankin, division engineer on the Atchison, Topeka & Santa Fe, with headquarters at Arkansas City, Kan., has been promoted to trainmaster at Wellington, Kan. Mr. Rankin was born at Lecompton, Kan., on March 29, 1891, and graduated from the University of Kansas in 1915. He entered railway service on August 15 of the same year as a chainman on the Eastern division of the Santa Fe and was promoted successively to rodman and transitman. He entered the U. S. Army on April 15, 1918, and served in the meteorological section of the signal corps. He returned to the Santa Fe on May 1, 1919, as a transitman and was promoted to assistant engineer in the office of the chief engineer, Eastern lines, at Topeka, Kan., on May 16, 1924. On December 16, 1926, he was appointed office engineer on the Southern Kansas division at Chanute, Kan., and in May, 1928, he was advanced to division engineer at that point. Mr. Rankin was appointed office engineer at Chanute in October, 1931, and in 1937, he was promoted to division engineer at Marceline, Mo. He was transferred to Arkansas City on November 1, 1938.

D. M. Rankin

G. C. Jefferis, assistant general manager of the Northern district of the Western lines of the Atchison, Topeka & Santa Fe, with headquarters at La Junta, Colo., and an engineer by training and experience, has been promoted to assistant to the vice-president, with headquarters at Chicago. A photograph and sketch of Mr. Jefferis appeared in *Railway Engineering and Maintenance* for August, 1938, following his promotion to assistant general manager at that time.

John A. Gillies, assistant general manager of the Eastern district of the Eastern lines of the Atchison, Topeka & Santa Fe, with headquarters at Topeka, Kan., and an engineer by training and experience, has been promoted to general manager of the Western lines of the Atchison, Topeka & Santa Fe, with headquarters at Amarillo, Tex. Mr. Gillies was born at Winnipeg, Man. on August 14, 1889, and entered railway service on June 15, 1906, as a chainman on the Santa Fe in New Mexico. He advanced through various positions in the engineering department, including those of rodman and transitman, and on May 1, 1915, he was further promoted to district engineer of the Southern district, with headquarters at Amarillo, later being transferred to the Northern district, with headquarters at La Junta, Colo. On October 1, 1918, he was promoted to trainmaster on the Western division at Dodge City, Kan., and on May 15, 1923, he was promoted to assistant superintendent of that division, with the same headquarters. Mr. Gillies was further advanced to superintendent of the Slaton division on November 15, 1928, and four years later he was transferred to the Colorado division, with headquarters at Pueblo, Colo. On January 10, 1937, he was promoted to assistant general manager of the Northern district of the Western lines, with headquarters at La Junta and on July 1, 1938, he was transferred to the Eastern district of the Eastern lines, with headquarters at Topeka.

John A. Gillies

Clark Hungerford, superintendent on the Southern, with headquarters at Birmingham, Ala., and an engineer by training and experience, has been promoted to general manager, Western lines, with headquarters at Cincinnati, Ohio.

Howard O. Wagner, trainmaster on the Atchison, Topeka & Santa Fe at Wellington, Kan., and an engineer by training and experience, has been promoted to division superintendent, with headquarters at Arkansas City, Kan. Mr. Wagner was born at Enterprise, Kan., on March 3, 1891, and attended Kansas State College for three years. He entered railway service on July 1, 1912, between terms of school, serving in various capacities in the mechanical department of the Santa Fe at Wellington, Kan., during that summer and as a chainman in the engineering department at Pueblo, Colo., the following summer, returning to school in September. He returned to the engineering department of the Santa Fe at Pueblo on July 1, 1914, as a rodman and on December 15, 1914, he was transferred to Amarillo, Tex. Mr. Wagner was promoted to transitman on June 16, 1915, and to office engineer on November 16, 1916. On December 1, 1917, he was appointed assistant chief clerk in the superintendent's office at Amarillo and one month later he returned to the position of office engineer. On July 1, 1920, he was appointed building inspector, with headquarters at Amarillo, and on March 1, 1922, he was promoted to roadmaster, with headquarters at Wellington, Kan. Mr. Wagner was advanced to division engineer, with headquarters at Amarillo, on September 16, 1923, and on August 1, 1937, he was promoted to trainmaster, with headquarters at Wellington.

Howard O. Wagner

Engineering

E. M. Unzicker, instrumentman on the Alton at Bloomington, Ill., has been promoted to assistant division engineer, with the same headquarters, succeeding **L. E. Thornton,** whose promotion to assistant trainmaster is announced elsewhere in these columns.

W. R. Gillam, superintendent of the Springfield division of the Illinois Central has been appointed division engineer of the St. Louis division, with headquarters at Carbondale, Ill., succeeding **C. I. Van Arsdalen,** whose appointment as track supervisor at Champaign, Ill., is announced elsewhere in these columns.

Kelley W. Claybaugh, assistant roadmaster on the Atchison, Topeka & Santa Fe at Argentine, Kan., has been promoted to division engineer, with headquarters at Arkansas City, Kan., succeeding **D. M. Rankin,** whose promotion to trainmaster is announced elsewhere in these columns. A photograph and sketch of Mr. Clay-

baugh appeared in *Railway Engineering and Maintenance* for August, 1938, following his promotion to division engineer at that time.

J. W. Walter, trainmaster on the Atchison, Topeka & Santa Fe, with headquarters at El Paso, Tex., has been promoted to district engineer of the Northern district of the Western lines, with headquarters at La Junta, Colo., succeeding **Leon V. Lienhard,** whose appointment as trainmaster is announced elsewhere in these columns.

Walter C. Schakel, assistant engineer of the Peoria & Eastern at Indianapolis, Ind., has been promoted to office engineer in the office of the chief engineer of the Cleveland, Cincinnati, Chicago & St. Louis (Big Four) at Cincinnati, Ohio. This announcement appeared in the July issue, in which Mr. Schakel's name was incorrectly spelled as Walter S. Chanckle.

H. T. Livingston, superintendent of the Arkansas division of the Chicago, Rock Island & Pacific, with headquarters at Little Rock, Ark., has been promoted to engineer of bridges, with headquarters at Chicago, a newly-created position. **I. L. Simmons,** bridge engineer, with headquarters at Chicago, will continue in that capacity in charge of design and contracts. A photograph of Mr. Livingston, accompanied by a biographical sketch of his career, appeared in the July issue, following his promotion to superintendent at Little Rock.

Philip M. Stutrud, whose promotion to assistant chief engineer of the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn., was announced in the June issue, was born at Blair, Wis., on July 31, 1893, and attended the University of Minnesota and Chicago Technical College, graduating in civil engineering from the latter in June, 1916. Mr. Stutrud also attended evening school at the Minnesota College of Law, graduating in June, 1930, and was admitted to the Bar of the State of Minnesota in August,

Philip M. Stutrud

1930. In August, 1916, after previous experience in structural engineering with private concerns in Chicago and St. Paul, Minn., Mr. Stutrud entered railway service as a draftsman in the engineering department of the M. & St. L., and served for a time in various capacities, including those of draftsman, assistant engineer and chief clerk. In October, 1929, he was advanced to office engineer, with headquarters at Minneapolis, the position he held at the time of his recent promotion.

A. G. Reese, roadmaster on the Southern division of the Colorado & Southern, with headquarters at Trinidad, Colo., has been promoted to engineer of maintenance of way of the Colorado & Southern, the Fort Worth & Denver City and the Wichita Valley, with headquarters at Denver, Colo., succeeding **T. P. O'Neill,** whose death on July 6, is announced elsewhere in these columns.

As announced in the July issue, **O. B. Robbins** has been promoted to assistant bridge engineer of the Southern, with headquarters at Washintgon, D.C.

Mr. Robbins was born in LeSueur county, Minn., on August 23, 1878, and graduated in civil engineering from the University of Minnesota in 1903. During summer vacations while attending college, Mr. Robbins served with the Great Northern and the Northern Pacific on

O. B. Robbins

location and construction projects. After graduation he was employed for a short time by the American Bridge Company as a draftsman, inspector on field work and chief draftsman in the bridge department. In 1916, he became connected with the Bureau of Valuation of the Interstate Commerce Commission, being placed in charge of structural work for the Central district, with headquarters at Chicago. In 1921, he was sent to Washington as assistant bridge engineer of the Bureau of Valuation, remaining in his capacity until 1924 when he entered the service of the Southern as a designer in the office of the bridge engineer at Washington. Two years later he became an assistant engineer in the same office, which position he held until his recent appointment as assistant bridge engineer.

Monroe A. Stainer, whose promotion to assistant chief engineer of the Colorado & Southern, the Fort Worth & Denver City and the Wichita Valley, with headquarters at Denver, Colo., was announced in the July issue, was born at Hays, Kan., on April 9, 1883. After graduation from the University of Kansas in 1904, Mr. Stainer was employed by various contractors and consulting engineers, chiefly in the vicinity of Kansas City, Mo., until June, 1911, when he was made chief engineer of construction of the Nashville-Gallatin Interurban Railway at Nashville, Tenn. Upon the completion of this road

Monroe A. Stainer

he was made general superintendent and in 1914, he returned to Kansas City for further work with consulting engineers at that place. In October, 1915, he entered the service of the Panhandle & Santa Fe, in the valuation department at Amarillo, Tex., and in September, 1916, he was transferred to the Gulf, Colorado & Santa Fe at Galveston, Tex. Mr. Stainer was appointed roadmaster at Center, Tex., in July, 1917, and one year later he went with the Fort Worth & Denver City as assistant valuation engineer at Ft. Worth, Tex. In October, 1918, he was promoted to district engineer and in March, 1920, his title was changed to engineer of maintenance of way of the F. W. & D. C. and the Wichita Valley. In October, 1932, his title was changed to engineer, with headquarters as before at Ft. Worth, Tex., the position he held until his recent promotion.

P. L. Koehler, whose promotion to division engineer on the Chesapeake & Ohio, with headquarters at Ashland, Ky., was announced in the July issue, was born at Hamilton, Ohio, on October 22, 1901, and attended Denison university. He entered railway service on July 13, 1923, as an assistant foreman on the C. & O. at Huntington, W. Va., and two months later he was appointed a chainman on the system engineering force. On January 10, 1924, he was promoted to instrumentman and on April 20, 1925, he was advanced to assistant cost engineer, with headquarters at Huntington. Mr. Koehler was appointed supervisor of track, with headquarters at Rainelle, W. Va., on July 15, 1928, and on June 16, 1929, he was advanced to assistant division engineer, with headquarters at Covington, Ky. In December, 1929, he was transferred to Huntington and on June 1, 1936, he was transferred to Russell, Ky., where he was located at the time of his recent promotion.

Ervin J. Bayer, whose appointment as division engineer on the New York Central, with headquarters at Jersey Shore, Pa., was announced in the July issue, was

born in April, 1888, at Cincinnati, Ohio, and received his higher education at Purdue university, graduating with the class of 1910. Mr. Bayer first entered railway service on July 5, 1910, with the Cleveland, Cincinnati, Chicago & St. Louis (part of the New York Central System), serving as an assistant engineer at various points until 1914. He was then advanced to assistant engineer maintenance of way, and after serving in this capacity at various locations he was appointed acting engineer maintenance of way at Mt. Carmel, Ill., in 1918. After two years in the latter capacity, Mr. Bayer returned to the position of assistant engineer maintenance of way, holding this position at Galion, Ohio, until 1922, when he was made engineer maintenance of way of the Evansville, Indianapolis & Terre Haute (part of the Big Four) with headquarters at Washington, Ind., being transferred to the Peoria & Eastern (part of the N. Y. C.) with headquarters at Indianapolis, Ind., in 1924. Six years later he became division engineer on the Big Four at Indianapolis, returning to the P. & E. as assistant division engineer in 1933. In 1938, Mr. Bayer was transferred to Springfield, Ohio, on the Big Four, where he was located at the time of his recent appointment as division engineer on the N. Y. C.

Barton Wheelwright, engineer maintenance of way, Central region, Canadian National, with headquarters at Toronto, Ont., has been appointed chief engineer of the Central region, with the same headquarters, succeeding **Thomas T. Irving,** who has retired. **J. P. Menard,** division engineer at Quebec, Que., has been promoted to district engineer of the Quebec district, with the same headquarters, relieving **Lucian Brousseau,** who has been advanced to engineer maintenance of way, Central region, with headquarters at Toronto, replacing Mr. Wheelwright. **J. F. A. Gosselin,** has been appointed division engineer of the Laurentian division, with headquarters at Quebec, to succeed Mr. Menard.

Mr. Wheelwright entered the service of the Grand Trunk at Toronto in 1911 as a draughtsman. A year later he went to Montreal, Que., as a signal inspector and

Barton Wheelwright

in 1914 became assistant signal engineer. Two years later he was appointed signal engineer and in 1918, he went to Portland, Me., as engineer maintenance of way. Mr. Wheelwright returned to Montreal in 1920 as engineer accountant and in 1923 was promoted to special engineer at Toronto. In 1928, he became assistant to the chief engineer and in 1936, was promoted to engineer maintenance of way of the Central region, which position he held until his recent appointment as chief engineer of that region.

Mr. Irving was born at Vernon, Prince Edward Island. He was graduated from McGill University in 1898, and became assistant to the resident engineer of the old Grand Trunk system at Montreal in the same year. Four years later he be-

Thomas T. Irving

came a resident engineer and in 1902, was transferred to the Grand Trunk Western in a similar capacity, later serving as di-

Lucien Brousseau

vision and chief engineer in the Grand Trunk Western territory. In 1924 Mr. Irving became chief engineer of the Central region of the Canadian National at Toronto, the position he held until his retirement.

Mr. Brousseau was born at Sorel, Que., in 1887. He joined the Intercolonial railway as division engineer at Levis, Que., in 1913, and in 1920, he was appointed district engineer for the Canadian National at Quebec City, the position he held until his recent appointment as engineer maintenance of way of the Central region.

Mr. Menard was born at Cedars, Que., on April 13, 1881. He joined the staff of the Transcontinental Railway in 1907, and served as assistant division engineer of construction and resident engineer. Later he became assistant engineer of the Cana-

J. P. Menard

dian National's Montreal division and engineer of the Saguenay division. During the past seven years Mr. Menard has been engineer of the Laurentian division at Quebec.

P. O. Ferris, engineer maintenance of way of the Delaware & Hudson, with headquarters at Albany, N.Y., has been appointed chief engineer, to succeed **James MacMartin,** who has retired at his own request, effective July 1. The position of engineer maintenance of way has been abolished, for the present, and all work formerly under the jurisdiction of the engineer maintenance of way will be handled by the chief engineer. A photograph of Mr. Ferris and a biographical sketch of his railroad career were published in the March, 1939, issue in connection with his appointment as engineer maintenance of way.

Mr. MacMartin was born on September 12, 1865, at Johnstown, N.Y., and attended Phillips Andover Academy and Rensselaer Polytechnic Institute, Troy, N.Y. He entered railroad service in 1890 as a draftsman with the Delaware & Hudson at Albany, serving in this capacity and as rodman, levelman and transitman until 1896. He then served until 1899 as assistant en-

James MacMartin

gineer and superintendent of construction on the D. & H., and from 1899 to 1901 was acting chief engineer. From 1901 to

1909 Mr. MacMartin was chief engineer of the Delaware & Hudson and from 1909 to 1911 served as vice-president and general manager of the Elnora & Hamilton Contracting Company, general railway contractors. From 1911 to 1913 he was construction engineer and assistant chief engineer of the Delaware & Hudson, and chief engineer of the Wilkes-Barre Connecting Railway. From 1913 to 1927 he was chief engineer of the D. & H. and of the Wilkes-Barre Connecting Railway and from 1927 until his retirement on July 1, served as chief engineer and chairman of the valuation committee of the D. & H. and subsidiary companies.

Track

E. J. Brady has been appointed track supervisor of Subdivision No. 1 of the Meadville division of the Erie, with headquarters at Jamestown, N.Y., succeeding **A. J. Bernard,** who has been transferred.

J. W. Ewalt, assistant on the engineering corps of the Pennsylvania, has been promoted to assistant supervisor on the Philadelphia division, at Lancaster, Pa., succeeding **J. C. Warren,** who has been appointed acting supervisor on the Williamsport division at Northumberland, Pa.

A. F. Wilson, instrumentman in the engineering department of the Canadian National, has been promoted to roadmaster at Kamloops, B.C., succeeding **D. C. Gough,** whose promotion to acting transportation assistant of the Vancouver Island Lines, was announced in the July issue.

C. I. Van Arsdalen, division engineer of the St. Louis division of the Illinois Central, with headquarters at Carbondale, Ill., has been appointed track supervisor, with headquarters at Champaign, Ill., replacing **J. Brosnahan,** who has been transferred to Gilman, Ill., relieving **E. R. Fitzgerald,** who has retired.

William G. Ashworth, trainmaster on the Northern Pacific at Centralia, Wash., has been appointed supervisor of maintenance of the Spokane, Portland & Seattle, with headquarters at Portland, Ore., a newly-created position, and **C. Whitfield,** division roadmaster, with headquarters at Portland has retired. The position of division roadmaster has been abolished.

George L. Teyro, whose promotion to general roadmaster on the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn., was announced in the June issue, of *Railway Engineering and Maintenance,* was born at Waterville, Minn., on July 11, 1890, and entered railway service on July 1, 1907, as a section laborer on the M. & St. L., later being promoted successively to section foreman and extra gang foreman. On April 1, 1920, Mr. Teyro was promoted to supervisor of track at Conde, S.D., and later was transferred to Monmouth, Ill., and Hopkins, Minn. He was located at the latter point at the time of his recent promotion.

J. R. Brosnan, assistant supervisor of bridges and buildings on the Alabama Great Southern (part of the Southern system) at Birmingham, Ala., has been promoted to track supervisor on the Southern, with headquarters at Princeton, Ind., succeeding **A. W. Stone,** who has been transferred to Birmingham, Ala., on the Alabama Great Southern, replacing **B. Correll,** who retired on June 30 because of ill health. **J. B. Singleton,** student apprentice, has been promoted to assistant track supervisor at Princeton, Ind., relieving **C. I. Parsons,** whose promotion to assistant supervisor of bridges and buildings is announced elsewhere in these columns.

George Green, whose promotion to roadmaster on the Chicago, Burlington & Quincy, with headquarters at Orleans, Neb., was announced in the July issue, of *Railway Engineering and Maintenance,* was born at York, Neb., on October 25, 1904, and entered railway service on March 1, 1920, as a section laborer on the Burlington. He was promoted to relief section foreman on December 1, 1925, and on November 1, 1928, he was appointed section foreman at York. On September 16, 1931, he was advanced to track supervisor but a few months later he was relieved and returned to his position as section foreman. Mr. Green was promoted to track supervisor again in May, 1934, with headquarters at York, the position he held until his recent promotion.

Gilbert D. Mayer, assistant cost engineer on the Chesapeake & Ohio has been promoted to supervisor of track, with headquarters at St. Albans, W. Va., succeeding **B. Jackson,** who has retired. Mr. Mayer was born on January 21, 1900, at Fort Oglethorpe, Ga., and received his higher education at Washington & Lee university. He entered railway service with the C. & O. on February 9, 1926, as an assistant signalman. Two months later he was transferred to the engineering department as an instrumentman and in May, 1927, he became a rodman. Mr. Mayer was appointed assistant cost engineer in June, 1929, which position he held until his recent appointment as supervisor of track, which became effective on July 1.

A. G. Ayers, whose retirement as roadmaster on the Canadian National, with headquarters at Melville, Sask., was announced in the July issue, was born on Prince Edward Island on May 3, 1874, and entered railway service on April 18, 1899, as a section laborer in Manitoba on the Northern Pacific (later Canadian Northern and now part of the Canadian National system). In September, 1902, he was promoted to section foreman at Belmont, Man., and on September 14, 1909, he was advanced to yard foreman at Brandon, Man. Mr. Ayers later served as extra gang foreman, assistant roadmaster and relief roadmaster during the summer months for a number of years and was promoted to roadmaster at Swan River, Man., on May 15, 1931. On December 1, 1931, he was transferred to Melville, where he remained until his retirement.

John Carbone, whose promotion to roadmaster on the Chicago, Burlington & Quincy, with headquarters at Chicago, was announced in the June issue, was born at Streator, Ill., on September 22, 1904, and entered railway service in July, 1918, as a section laborer on the Burlington at Chicago. In August, 1919, he was appointed a welder and in December, 1919, he was promoted to section foreman. In April, 1920, he became a machinist helper in the mechanical department and on October 6, 1922, he became a locomotive fireman in train service. On May 2, 1932, Mr. Carbone returned to the maintenance of way department as an assistant extra gang foreman and on August 24, 1933, he was appointed an assistant foreman. On August 1, 1934, he was promoted to track supervisor at Chicago, the position he held until his recent promotion, which was effective May 15. All of Mr. Carbone's service has been on the Chicago Terminal division.

Le Roy H. Miller, assistant supervisor of track on the Pennsylvania, whose promotion to supervisor of track, with headquarters at Harrington, Del., was announced in the July issue, was born on February 8, 1908, at New Market, Ind. Mr. Miller received his higher education at Purdue university, graduating in 1932. While attending school, Mr. Miller served during summer vacations with the Pennsylvania as a trackman, track foreman and rodman, continuing in the service of this company after his graduation. On March 1, 1934, he became an assistant on the engineering corps of the Cincinnati division, holding this position until October 16 of the same year, when he was promoted to assistant supervisor of track on the Buffalo division at Olean, N.Y. Later he served in the same capacity on the Long Island railroad at Jamaica, N.Y., and on the New York division at New Brunswick, N.J., being located at the latter point at the time of his recent promotion to supervisor of track.

Raymon M. Bristow, whose promotion to roadmaster on the Chicago, Rock Island and Pacific, with headquarters at St. Joseph, Mo., was announced in the July issue, was born at Anadarko, Okla., on October 20, 1902, and attended the U. S. Naval Academy at Annapolis, Md., for one year in 1921 and 1922, and Oklahoma University for two years. He entered railway service in September, 1924, as a chainman in the engineering department of the Rock Island at El Reno, Okla., and in 1926 he was promoted to rodman. Mr. Bristow was appointed a masonry inspector in 1927, and the following year he was promoted to assistant engineer at Kansas City, Mo. He was transferred to El Reno in 1930, and in 1931 he was appointed masonry inspector at Haileyville, Okla. Two years later he was appointed a rodman at Trenton, Mo., and in 1934 he was promoted to track supervisor, with headquarters at Sioux Falls, S.D. Mr. Bristow was transferred to Muscatine, Ia., in 1935 and to St. Louis, Mo., on July 8, 1936. He was located at the latter point until his recent promotion.

John H. Lynch, whose retirement as roadmaster on the Chicago, Rock Island & Pacific at Chickasha, Okla., was announced in the July issue, was born at West Branch, Ia., on February 2, 1872, and attended the Iowa City Commercial College, Iowa City, Ia., for two years. He entered railway service on October 9,

1887, as a section laborer on the Burlington, Cedar Rapids & Northern (now part of the Rock Island), and in November, 1890, he was promoted to section foreman. On April 1, 1895, he was advanced to extra gang foreman at Cedar Rapids, Ia. He was later transferred to Davenport, Ia., on track elevation work and upon its completion was appointed yardmaster at that point. In May, 1905, Mr. Lynch was transferred to Shawnee, Okla., as a conductor and four months later he was appointed roadmaster at Oklahoma City, Okla. In January, 1906, he was promoted to trainmaster at Fordyce, Ark., and six months later he was appointed acting superintendent at El Dorado, Ark. Mr. Lynch was transferred to Chickasha in November, 1907, as general yardmaster and one year later, when the terminal at Chickasha was abolished, he was appointed roadmaster at that point, remaining in that position until his retirement.

H. Lynn Locke, whose promotion to supervisor of track on the Reading, with headquarters at West Milton, Pa., was announced in the June issue, was born on June 3, 1899, at Altoona, Pa., and received his higher education at Pennsylvania State college, graduating in 1922. He entered railway service with the Pennsylvania on September 5, 1922, as a rodman on the Middle division, with headquarters at Altoona. On April 6, 1926, he was promoted to assistant supervisor of track, with headquarters at Phillipsburg, N.J. In the following year, Mr. Locke resigned from this position and engaged in private engineering work in suburban Philadelphia until 1929. On November 19 of that year, he entered the service of the Reading as a transitman in the chief engineer's office at Philadelphia, Pa., in which capacity he remained until October 5, 1936, when he was appointed assistant supervisor of track on the Philadelphia division, with headquarters at Lansdale, Pa., subsequently serving in this capacity at West Trenton, N.J., and at Reading, Pa., where he was connected with the general manager's staff. He was located at the latter point at the time of his recent promotion to supervisor of track at West Milton.

William G. Cowie, assistant supervisor of track on the New York Central at Batavia, N.Y., has been promoted to supervisor of track of Subdivision 30 of the Buffalo division, with headquarters at Rochester, N.Y., succeeding **J. D. Salisbury,** who was retired. **Earl T. Delaney,** track foreman at Jersey Shore, Pa., has been promoted to assistant supervisor of track of Subdivision 30 of the Buffalo division, to succeed **P. S. Burnham,** who has been transferred to Subdivision 12 of the same division, with headquarters at Batavia, to succeed Mr. Cowie.

Mr. Cowie was born on November 1, 1890, at Holyoke, Mass., and was educated in civil engineering at Rennselaer Polytechnic Institute. He entered railway service with the New York Central on August 15, 1921, as a rodman at Rochester, being promoted to transitman at Buffalo, N.Y., on July 1, 1925. He was further advanced to assistant supervisor of track at North Tonawanda, N.Y., on February 1, 1928, being transferred to the main line at Batavia on July 1, 1935. He was located at the latter point at the time of his recent promotion to supervisor of track, which was effective on July 1.

Arch R. Matteson, whose promotion to supervisor of track on the Pennsylvania, with headquarters at Cleveland, Ohio, was announced in the July issue, was born at Butler, Pa., on March 28, 1909, and attended Rensselaer Polytechnic Institute for one year in 1929 and 1930, and Carnegie Institute of Technology for three years. He entered railway service on March 5, 1934, as an assistant on the engineering corps of the Pennsylvania at Buffalo, N.Y., and four months later was transferred to Mansfield, Ohio. On December 1, 1934, he was transferred to Johnstown, Pa., and on March 1, 1935, he was promoted to assistant supervisor at Wellsville, Ohio. Mr. Matteson was transferred to West Philadelphia, Pa., on January 1, 1936, and to North Philadelphia on July 1, 1937. On May 15, 1938, he was transferred to Harrisburg, Pa., where he was located at the time of his recent promotion.

Louis J. Schwabe, assistant roadmaster on the Chicago & North Western at Madison, Wis., has been promoted to roadmaster at Fremont, Neb., replacing **E. D. Bentz,** who has been transferred to Norfolk, Neb., relieving **J. H. Bratton,** who retired because of ill health on July 1.

Mr. Schwabe was born at Star Lake, Wis., on October 21, 1895, and entered railway service on April 11, 1912, as a section laborer on the North Western. In 1914 and 1915, he served in the signal service, returning to the position of section laborer in 1916. Mr. Schwabe was promoted to section foreman on April 16, 1917, and on March 27, 1918, he entered military service. He returned to the North Western as a section foreman in 1919, and on August 15, 1935, he was advanced to assistant roadmaster at Chicago, later being transferred to Madison, Wis.

Mr. Bratton was born at Franklin Grove, Ill., on December 7, 1875, and entered railway service on August 15, 1892, as a section laborer on the North Western at Franklin Grove. On June 15, 1901, he was promoted to section foreman at Ashton, Ill., and three years later he was advanced to yard foreman at DeKalb, Ill. From May 1, 1909, until October 1, 1911, Mr. Bratton was placed in charge of extra gangs surfacing and laying rail on the Galena division, and at the end of that period was promoted to assistant roadmaster at Sterling, Ill. On April 15, 1913, he returned to DeKalb as yard foreman and thereafter served in that position and intermittently as acting roadmaster at various points until September 5, 1922, when he was promoted to roadmaster at West Chicago, Ill. On November 1, 1933, Mr. Bratton was transferred to Norfolk.

Bridge and Building

C. I. Parsons, assistant track supervisor on the Southern at Princeton, Ind., has been promoted to assistant supervisor of bridges and buildings at Birmingham, Ala., on the Alabama Great Southern (part of the Southern system), replacing **J. R. Brosnan,** whose promotion to track supervisor is announced elsewhere in these columns.

Thomas Clouse, bridge and building foreman on the Eastern Kentucky division of the Louisville & Nashville, has been promoted to assistant supervisor of bridges and buildings on that division, with headquarters at Ravenna, Ky., succeeding **H. K. Potts.**

Special

L. C. Hazlett, tie and timber inspector on the Missouri-Kansas-Texas at Shreveport, La., has been promoted to chief tie and timber inspector, with headquarters at Parsons, Kan., succeeding **William Elam,** who retired on July 1.

Mr. Elam was born on a farm near Parsons on May 18, 1873, and entered railway service as an inspector's helper on the Katy at Parsons on November 1, 1893. He later worked intermittently as an inspector and in 1904, he was promoted to chief tie and timber inspector, the position he held until his retirement.

Obituary

Charles Weedon Cochran, at one time engineer maintenance of way of the Cleveland, Cincinnnati, Chicago & St. Louis, died on May 26.

Foster J. Parkhurst, formerly roadmaster on the New York, Chicago & St. Louis (Nickel Plate), with headquarters at Rocky River Station, Ohio, died on June 18, at the age of 58.

C. F. Duvall, assistant engineer on the Texas & Pacific, with headquarters at Big Spring, Tex., died in the Texas & Pacific employee's hospital at Marshall, Tex., on June 30.

T. P. O'Neill, engineer maintenance of way of the Colorado & Southern, the Ft. Worth & Denver City and the Wichita Valley, with headquarters at Denver, Colo., died suddenly at that point of heart failure on July 6.

P. D. Fitzpatrick, general manager and former chief engineer of the Grand Trunk Western, with headquarters at Detroit, Mich., died in that city on July 25, following a brief illness. A photograph and an account of Mr. Fitzpatrick's career were published in the January, 1939, issue of *Railway Engineering and Maintenance,* following his promotion to general manager.

James Whitelaw, assistant engineer of bridges and roadways on the Canadian National at Montreal, Que., died June 28 at the age of 59. Born in Edinburgh, Scotland, on August 3, 1880, he entered railway service at Moncton, N.B., on August 20, 1912, as a transitman in the bridge department of the Canadian Government Railways. He later became an assistant engineer and in May, 1921, was transferred to Toronto in the department of the engineer of standards. In March, 1923, he was transferred to Montreal, and served at that point until his death on June 28, 1939, at which time he was an assistant engineer of bridges and roadways on the Canadian National.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Association News

American Railway Bridge and Building Association

Members of the Executive Committee and the chairman of committees will meet in Chicago on August 7 to review the reports of the committees, to formulate the program for the 46th annual convention, to be held at the Hotel Stevens on October 17-19 and to transact other business of the association.

Railway Tie Association

At a recent meeting of the Executive Committee, a comprehensive committee organization was set up for the ensuing year which included the following committees:

Committee on Changes and Dimensions of Cross Ties, S. S. Curtis, chairman, Wood Preserving Corporation, Texarkana, Tex.

Committee on Checking and Splitting Ties, R. R. Poux, chairman, Erie, Orrville, Ohio.

Committee on Legislation, B. N. Johnson, chairman, B. Johnson and Sons, Richmond, Ind.

Committee on Manufacturing Practice, T. J. Turley, Jr., chairman, Bond Brothers, Louisville, Ky.

Committee on Moisture Gradient, A. A. Savage, chairman, Bond Brothers, Birmingham, Ala.

Committee on Specifications, D. C. Jones, chairman, Wood Preserving Corporation, Chicago.

Committee on Standard Adzing and Boring, H. R. Condon, chairman, Wood Preserving Corporation, Pittsburgh, Pa.

Statistical Committee, R. Van Meter, chairman, Wyoming Tie and Timber Company, Chicago.

Committee on Timber Conservation, R. H. White, Jr., chairman, Southern Wood Preserving Company, Atlanta, Ga.

American Railway Engineering Association

Only two committees of the association held meetings during July, these being the Committee on Iron and Steel Structures, which met at Detroit, Mich., on July 6 and 7, and the Committee on Maintenance of Way Work Equipment, which met at New York on July 20 and 21. Only one committee has scheduled a meeting during August—the Committee on Water Service, Fire Protection and Sanitation, which will meet at Chicago on August 15.

Following the completion and mailing of the 1939 Proceedings late in July, the membership has now received Bulletin No. 411, containing the Fifth Progress Report of the Joint Investigation of Fissures in Railroad Rails; the First Progress Report of the Joint Investigation of Continuous Welded Rail; the address by A. N. Talbot, professor emeritus, University of Illinois, on Stresses in Railroad Track, presented at the convention September 19-21. This compares with the last March; and the preliminary report of the Committee on Ties relative to tie renewal averages and costs per maintained mile.

Effective July 21, the Engineering Research Advisory committee of the Engineering division, A.A.R., consisting of seven members, has been superseded by a research committee of four, consisting of the chairman and first vice-chairman of the Construction and Maintenance section (A.R.E.A.), and the chairman of the Signal and Electrical sections. This committee will exercise supervision over the research work of the Engineering division, including the activities of its research engineer, subject to approval of the General committee of that division.

Bridge and Building Supply Men's Association

Although invitations have been in the mails less than three weeks, 12 companies have already arranged to participate in the exhibit to be presented during the convention of the American Railway Bridge and Building Association at the Hotel Stevens, Chicago, on October 17-19. Further applications should be addressed to W. S. Carlisle, Secretary, care of the National Lead Company, 900 West 18th Street, Chicago.

The companies which have arranged for space to date follow:

Armco Railway Sales Company, Middletown, Ohio.

Celotex Corporation, Chicago, Ill.

Paul Dickinson, Inc., Chicago, Ill.

Duff Norton Mfg. Company, Pittsburgh, Pa.

Fairmont Railway Motors, Fairmont, Minn.

Ingersoll-Rand Company, New York, N.Y.

Johns Manville Corporation, New York, N.Y.

Lehon Company, Chicago, Ill.

Lewis Bolt & Nut Company, Minneapolis, Minn.

Mall Tool Company, Chicago, Ill.

Master Builders Company, Cleveland, Ohio.

Modern Supply Company, Chicago, Ill.

Railway Engineering and Maintenance, Chicago, Ill.

Wood Preservers Association

A special committee has been set up to assemble data on paint coatings for creosoted wood and methods of application, with J. G.Segelken of the Bell Telephone Laboratories, New York, chairman.

The proceedings of last January's convention are now in the bindery and will be distributed to members early in August.

Track Supply Association

A total of 41 companies have now reserved 58 spaces for the presentation of their products at the annual exhibit of the Track Supply Association, presented coincident with the convention of the Roadmasters and Maintenance of Way Association at the Hotel Stevens, Chicago, as compared to reservation of 41 spaces by 31 exhibitors a year ago. Applications for space should be addressed to Lewis Thomas, secretary-treasurer, Track Supply Association, 59 East Van Buren Street, Chicago.

Those companies which have taken space since the July issue went to press follow:

Air Reduction Sales Co., New York, N.Y.

Armco Railroad Sales Co., Middletown, Ohio.

Eagle Grinding Wheel Co., Chicago, Ill.

Elastic Rail Spike Corporation, New York, N.Y.

Hayes Track Appliance Co., Richmond, Ind.

Illinois Malleable Iron Co., Chicago, Ill.

Kalamazoo Railway Supply Co, Kalamazoo, Mich.

Lundie Engineering Corporation, New York, N.Y.

The P & M Co., Chicago, Ill.

Pettibone Mulliken Corporation, Chicago, Ill.

Ramapo Ajax Division of the American Brake Shoe and Foundry Co., New York, N.Y.

Woolery Machine Co., Minneapolis, Minn.

Roadmasters and Maintenance of Way Association

President Lafleur now has in hand reports from four of the six standing committees and the other two are approaching completion. Details of the program for the convention, which will be held at the Hotel Stevens, Chicago, on September 19-21, are also being formulated at this time and will be sent to the members during the month of August.

Supply Trade News

General

Joseph T. Ryerson & Son, Inc., Chicago, has purchased the Philadelphia plant of the **Taylor-Wharton Iron & Steel Company** which Ryerson has been operating under lease.

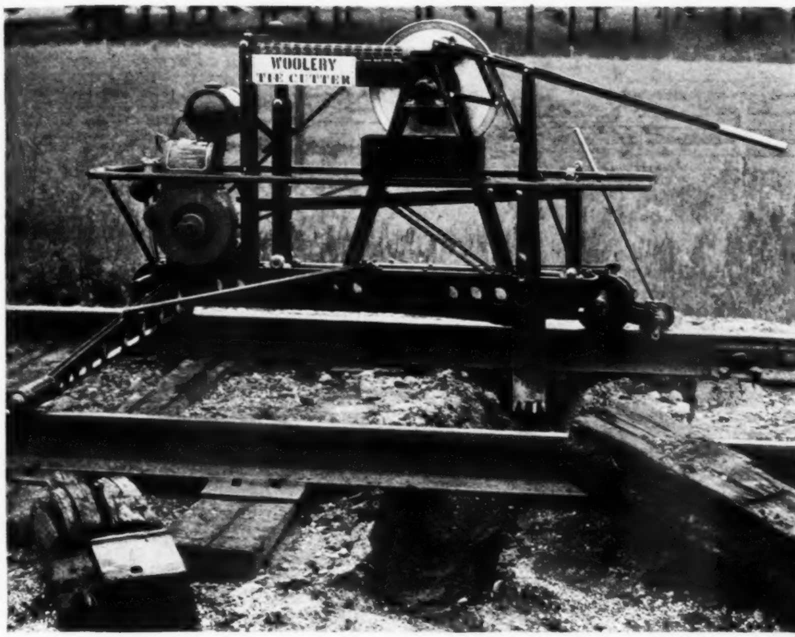
The Armco Railroad Sales Company on July 1, took over the railroad sales business heretofore conducted by the **Ingot Iron Railway Products Co. The Drainage Engineering Company** will continue to carry on its business in conjunction with the Armco Railroad Sales Company.

A license to practice certain patented processes by furnishing sodium hexametaphosphate in water treatment formulas has been granted the **Dearborn Chemical Company** through arrangements made with Calgon, Inc., and associated companies, who control the patents. Sodium hexametaphosphate is a chemical that is effective in preventing the precipitation of calcium carbonate at all temperatures up to 212 deg. F.

Effective July 15, the name of **Standard Equipments,** makers of Drews Evertite Side Bearings and Evertite Rail Joints, was changed to **Alcoma Railway Equipments,** with no change in personnel and

Why Dig Out Ballast

TO REMOVE A TIE!!!



- **ELIMINATE TRENCHING**
- **Make the Work Easier**
- **Speed Up Renewals**
- **Preserve Solidarity of Roadbed**
- **Save 12 cents or More On Every Tie**

The WOOLERY

TIE CUTTER

Eliminates the necessity for digging out the adjacent crib.

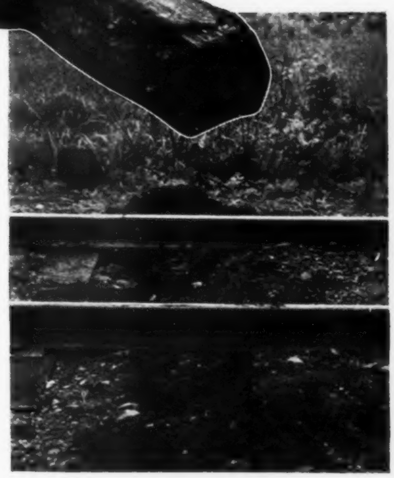
Saves the handling of 1/4 cu. yd. of ballast every time a tie is renewed.

Avoids disturbing the compacted bed on which the old tie rested.

By cutting the old tie in three pieces, which are easily lifted out, the old trench is left undisturbed, ready for drawing in the new tie.

ELIMINATION of BALLAST REMOVAL is just *one* of the many features that CUT COSTS 30% when the Woolery Tie Cutter is used to replace the digging-in method of tie renewal.

Investigate this outstanding development—let us demonstrate on YOUR road. Our 12-page booklet fully describes this money saver—write for a copy.



The Ballast Trough As It Appears Upon Removing a Tie. After a Small Amount of Dressing, Up the Trough is Ready to Receive the New Tie.

WOOLERY MACHINE COMPANY

MINNEAPOLIS MINNESOTA

Pioneer Manufacturers of
RAILWAY WEED BURNERS · MOTOR CARS
BOLT TIGHTENERS · TIE SCORERS · HEAVY
DUTY WORK CARS · TIE CUTTERS . . . .

WOOLERY
MINNEAPOLIS

RAILWAY
MAINTENANCE
EQUIPMENT

with headquarters as before at 310 So. Michigan avenue, Chicago.

The Cleveland district offices of **The Linde Air Products Company,** the **Carbide and Carbon Chemicals Corporation,** and the **Haynes Stellite Company,** all of which are units of the **Union Carbide and Carbon Corporation,** New York, are now located at 1517 Superior avenue, Cleveland, Ohio. The district managers are **H. H. Dyar,** for The Linde Air Products Company, **E. E. Fogle,** for the Carbide and Carbon Chemicals Corporation, and **F. P. Shephard,** for the Haynes Stellite Company.

The American Manganese Steel Division of the American Brake Shoe & Foundry Co., has expanded its main plant at Chicago Heights, Ill., with six additions and a new administration building. The administration building is 105 ft. by 94 ft. and two stories high, while the additions include an employees' welfare building, 82 ft. 8 in. by 55 ft.; a foundry, 120 ft. by 80 ft.; a pattern storage, 127 ft. by 152 ft.; a machine shop, 50 ft. by 80 ft.; a shipping room, 50 ft. by 200 ft.; and a heating plant, 50 ft. by 48 ft.

Personal

Emmett J. Fallon, vice-president of the **Des Moines Foundry & Machinery Company** and the **Grinnell Washing Machinery Corporation,** with headquarters at Chicago, has been elected president of the **Pettibone Mulliken Corporation,** Chicago.

H. R. Condon, vice-president of **The Wood Preserving Corporation,** a **Koppers Company** subsidiary, has been transferred from the company's Philadelphia, Pa., office to the Pittsburgh general office. Mr. Condon formerly was in charge of the corporation's eastern division.

M. Iseldyke, Jr., vice-president of The Q & C Company, New York, has been elected president. Mr. Iseldyke, who started his career in the mechanical department of the Delaware, Lackawanna & Western, has

M. Iseldyke, Jr.

been with the Q & C Company since 1913, serving in the capacity of secretary for a number of years. **R. R. Martin,** who has been with the company for 24 years, was elected secretary and treasurer. Both of these officers will also serve on the board of directors. **W. M. Vinnedge,** southeastern railroad sales representative of the Worthington Pump & Machinery Corporation at Harrison, N. J., has been appointed eastern district sales manager of The Q & C Company, with headquarters at New York.

Mr. Vinnedge was born on March 15, 1895, at Lafayette, Ind., and was educated in electrical engineering at Purdue university, graduating in 1916. After his graduation he entered the service of the West-

W. M. Vinnedge

ern Electric Company as an apprentice at Pittsburgh, Pa., being transferred to the sales department with headquarters at Omaha, Nebr., in 1917. Shortly thereafter, Mr. Vinnedge went with the General Electric Company as a sales engineer at New York, remaining with this company until 1921, when he became connected with the American Brown Boveri Company, Inc., as a sales engineer at Camden, N. J. In 1925, he went with Metalweld, Inc., as manager of sales of portable air compressors. Five years later, when the business of this company was acquired by the Worthington Pump & Machinery Corporation, Mr. Vinnedge entered the service of the latter company as a sales representative. In 1932 he was promoted to eastern regional manager of sales of locomotive feedwater heaters, with headquarters at Harrison, N. J. In 1938, he became southeastern railroad sales representative with the same headquarters, and was holding this position at the time of his appointment as eastern district sales manager of The Q & C Company, with headquarters at New York.

Trade Publications

Airco Products—The Air Reduction Sales Company, New York, has published two illustrated catalogs covering its entire line of Airco welding and cutting apparatus and supplies. Catalog 22, 32 pages; is devoted to Airco hand welding and cutting torches and tips, pressure regulators, fluxes, rods and other supplies. In addition, eight complete outfits covering the entire range of industrial uses are shown, and other equipment listed and illustrated includes portable oxygen and acetylene manifolds, circular cutting attachments, cylinder trucks and torch extensions. Catalog 21, 64 pages, gives, in addition to items mentioned in Catalog 22, information dealing with acetylene generators, industrial gases and oxyacetylene machines. Several pages are also devoted to pipe line safety devices.

Douglas Fir Plywood—A 12-page booklet entitled Data about Douglas Fir Plywood has been issued by the Douglas Fir Plywood Association, Tacoma, Wash., describing the manufacture and use of this product. The catalogue describes the various grades of plywood, their trade names and their uses in both interior and exterior building work and for form panels in concrete work. Also included are deflection charts and test data presenting a comparison of the strength of Douglas fir plywood with other standard building materials. The publication is illustrated with many examples of the use of this product.

Steel Roofing Products—The Republic Steel Corporation, Cleveland, Ohio, has published a 32 page, two-color catalog entitled "Republic Steel Roofing Products," in which are presented detailed descriptions and illustrations of various types of steel roofing and roofing specialties manufactured by this company, together with Republic galvannealed sheets and Enduro stainless steel sheets. Incorporated in the catalog are tables of weights and freight per square, rolling limits, bundling tables for galvanized flat sheets, allowances for laps on corrugated sheets, extras on galvanized or painted roofing and siding and an estimating table for roofing products.

Byers General Catalog—The A. M. Byers Company, Pittsburgh, Pa., has just published a 58-page consolidated general catalog which contains a complete listing of the products of this company, and contains standard specifications, dimensions and other information essential to both the specifier and the purchaser. The catalog also contains a section describing the physical properties of wrought iron, explanatory material telling how to specify wrought iron and steel products, how to order tubular products and how to identify markings, and is completely indexed. It is trimmed to a size of 8½ by 11 in., is wire-bound and is attractively printed in large type.

Bin-Type Retaining Walls—The Armco Culvert Manufacturers Association, Middletown, Ohio, has published a 16-page bulletin, No. H-27, illustrating and describing its new "cellular" retaining wall of single bin construction, made of Armco Ingot Iron. Various uses for this wall are suggested, such as slope stabilization, wing walls, restricted right of way, and for resisting wave action or erosion adjacent to lakes or streams. It is claimed that this type of retaining wall can be adapted to low or high walls, curves, and changes in elevation of the top or base. Other advantages listed include year-round construction, easy installation by unskilled labor, no curing period, free drainage, 100 per cent salvage value and long life due to the rust-resisting Armco Ingot Iron. The bulletin includes a table of sizes, suggested plans of construction are shown, and general installation instructions are described and pictured.

ALPHABETICAL INDEX TO ADVERTISERS